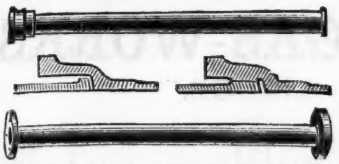
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVIII. No. 1486.] LONDON, NOVEMBER 3, 1891. [43RD YEAR. Price 6d.

GAS AND WATER PIPES.

1¼ to 12 IN. BORE.



THOMAS ALLAN & SONS,

Bon Lea Foundry,

SOUTH STOCKTON-ON-TEES.

ALSO MANUFACTURERS OF

SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.

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— ESTABLISHED 1830. —

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Manufacturers & Contractors.

THE ONLY MAKERS OF

PATENT ANTIMONY PAINT,

Parker's Imperial Black Varnish,

Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:

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WOLSTON'S

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Special Quotations to Gas Companies.

DARTMOUTH, DEVON.

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Portland Cement

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ESTABLISHED 1811—OVER THREE QUARTERS OF A CENTURY.

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Capable of withstanding Greater Heat than that adequate to the Fusion of Iron.

Supplied to Her Majesty The Queen; to His Royal Highness The Prince of Wales; and to Her Majesty's Government; to Foreign Governments; and to public and private Gas-Works, &c., in GREAT BRITAIN and IRELAND, in ALL THE COLONIES, and in EVERY OTHER PART OF THE WORLD where Gas is used.

PURIMACHOS is regularly and increasingly used in GAS-WORKS at home and abroad, and has received the special commendation of the most distinguished Engineers and Managers, as invaluable for promptly and economically **building, glazing, repairing,** and **consolidating** RETORTS and FURNACES (in and out of action), PIPES, and ALL OTHER ERECTIONS (of Clay, Brick, or Iron) where FIRE or HEAT is employed—the action of which it will effectually resist.

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PATENT PURIFYING MACHINE,

Which has now fully proved itself to be the most effectual, powerful, and perfect Apparatus in the World,

FOR PURIFYING GAS FROM

TAR, CARBONIC ACID, AMMONIA,

and a large portion of

SULPHURETTED HYDROGEN,

Doing all the work of Purification between the Condensers and Purifiers, and relieving them of much work. Its cost is less than any other known Apparatus for purifying Gas from Tar and Ammonia.

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Manufacturers of

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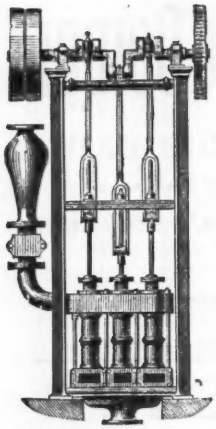
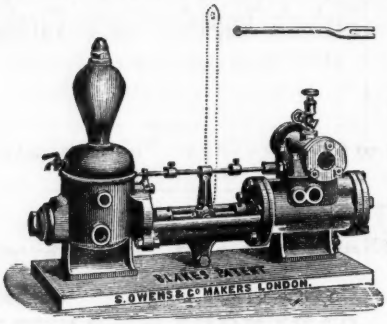


Treble-Barrel Pumps in Frame.

Syphon Pump.

Double-Barrel Force-Pump in Frame.



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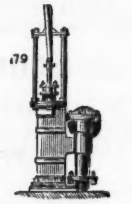
20,000 IN USE.



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Wrought-Iron Portable Pump.

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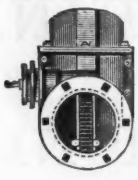

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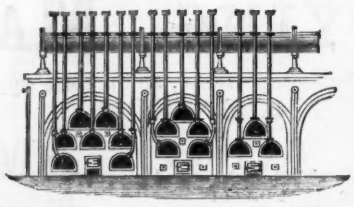

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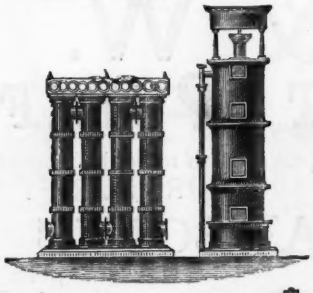

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for working Purifiers.

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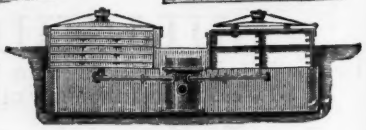

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GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

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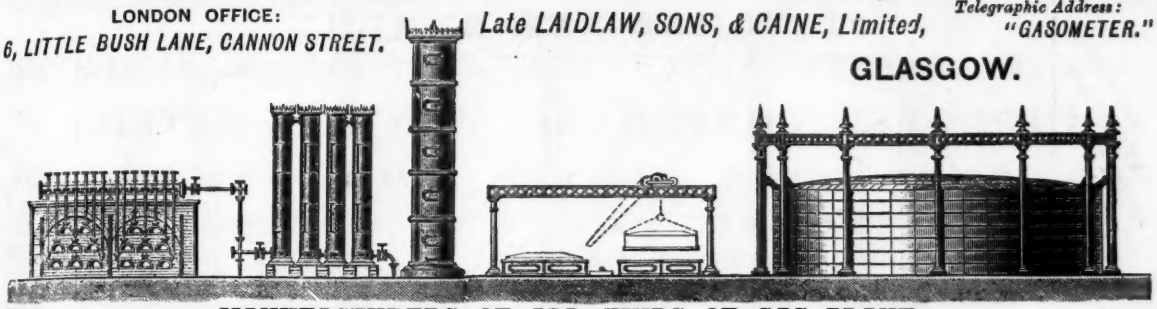

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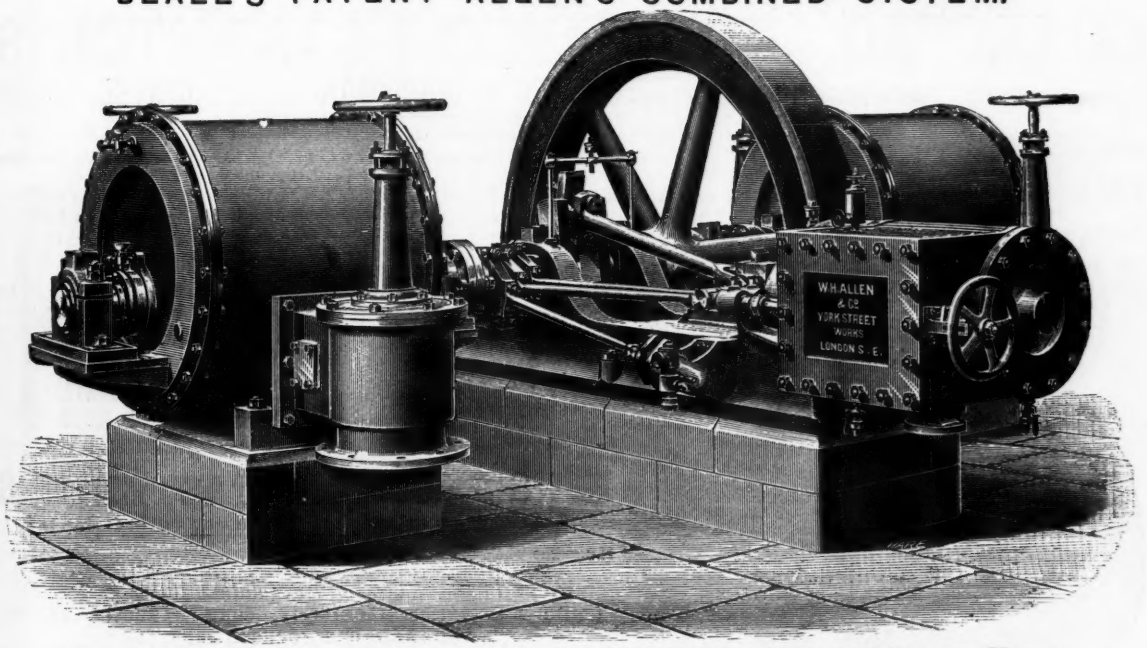

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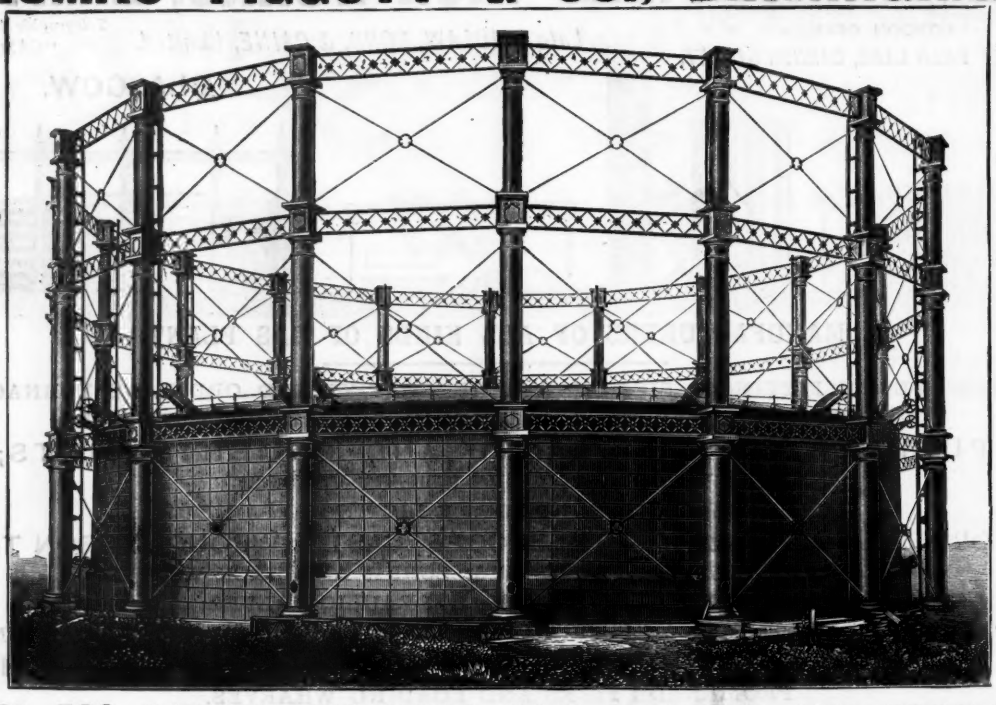

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INCLUDING THOSE SUPPLIED TO THE FOLLOWING GAS COMPANIES AND CORPORATIONS:

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BECKTON.	BRADFORD.	CARDIFF.	LEEDS.	NOTTINGHAM.	RIO GRANDE.	SYDNEY.
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WEST'S GAS IMPROVEMENT Co., Ltd.,

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MANUFACTURERS OF

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FOR

CHARGING AND DRAWING GAS-RETORTS.

OVER **180** MACHINES AT WORK AND IN COURSE OF CONSTRUCTION.

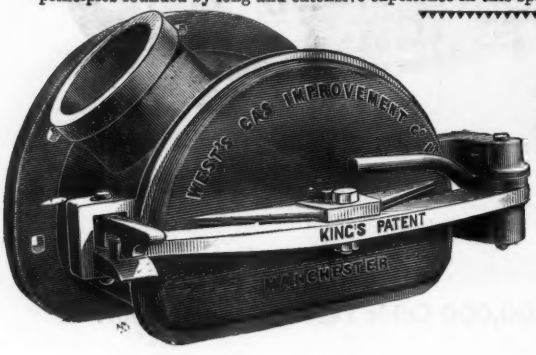
Advantages attending its use are:

INCREASED VOLUME of GAS per TON, and INCREASED YIELD per Retort.—The system of breaking and distributing the coals in an even layer in the retorts effecting more perfect carbonization.

REDUCTION in LABOUR and COST of WORKING.—In Works where this System of charging and drawing Retorts is adopted, there has been effected a substantial saving in the cost of Gas Manufacture in the Retort-House; the amount saved varying in different Gas-Works from **8 PENCE** to **15 PENCE per Ton** of coal carbonized. Full particulars will be forwarded upon application to W. G. I. Company, Limited.

MANUAL CHARGING AND DRAWING MACHINES.

POWER CHARGING AND DRAWING MACHINES, driven by COMPRESSED AIR, STEAM, or ROPE. The power machines are applicable to circular, oval, or Ω-shaped retorts and mouthpieces, and are the most perfect, economical, efficient, and durable machines made. They are constructed on principles founded by long and extensive experience in this special branch of gas engineering and the manufacture of gas.



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Sole Makers of CIRCULAR, OVAL, or Ω-shaped MOUTHPIECES with Morton's Self-Sealing Lids, fitted with

KING'S PATENT FASTENINGS,

secure a very tight joint; and at the same time the eccentric motion given to the Lid effectually removes the Tar from the surfaces of the Joint.

N.B.—The whole of these Fittings are made of Wrought Iron. Several Thousands in use.

West's Improved Combined Regulating Liquor Seal Valve.

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MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

ESTABLISHED MORE THAN A QUARTER OF A CENTURY

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CLAYTON SON & CO. LTD.

MAKE A

SPECIALTY
OF
GASHOLDERS

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GAS PLANT OF EVERY DESCRIPTION.

THE WIGAN COAL & IRON CO., LIMTD.,

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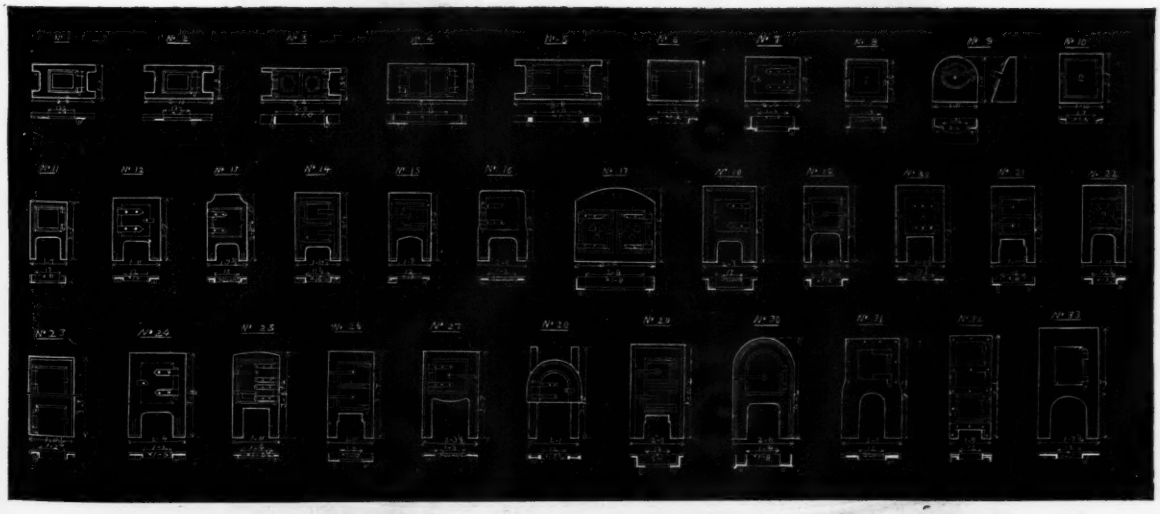

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Furnace Doors and Frames suitable for Generator, Regenerator, and ordinary Retort Furnaces.

MOST OF THE ABOVE DESIGNS CAN BE MADE IN WROUGHT IRON, IF DESIRED.

Patterns for other Designs made to Order.

RICHMOND & CO., LTD., GAS APPARATUS MANUFACTURERS, WARRINGTON.

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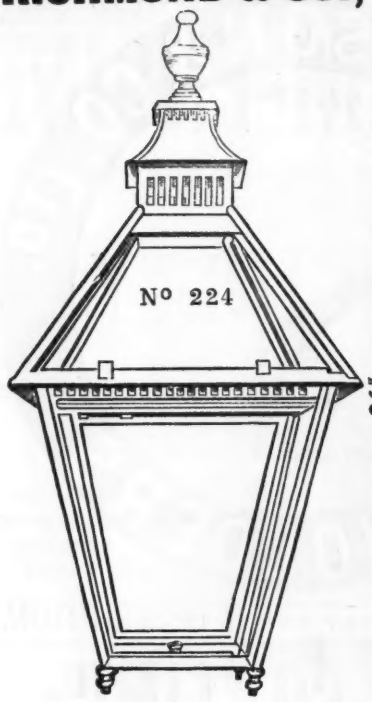

WEBB'S IMPROVED PUTTYLESS LAMP.

	EXTREME WIDTH. INS.	INS.
No. 224. **Puttyless Street Lamp,** all Copper Frame, **with Lighting Door.** The glass being fixed in our improved grooved bars, new squares can be inserted in much less time, and less wear and tear to the Lamp, than by the old method. Glazed all Clear Glass and painted any Approved Colour.	16½	15
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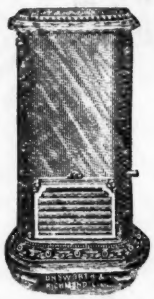
Extra Opal Top Squares, 2/3 per Lamp.

Extra Pins and Nuts, 1/6.

No. 225. **Ordinary Puttied Lamp,** as above	20/-	18/-



New List of Heating-Stoves

Ready Oct. 20.

No. **550.**

Made of Blue Coated Steel, with a surface equal to Plate Glass.

Requires no Black Varnish, and can easily be kept Clean with a Dry Duster.

Size: 30in. high, 18in. wide over all.

Price, **22s.**

Suitable for Rooms 14ft. square.

No. **560.**

This is a handsome Stove, with Bright Copper Reflector, and body of Bright Blue Coated Steel, fitted with Hot-Air Tubes, suitable for Entrance-Halls, or rooms up to about 18ft. square, and burns with a white flame.

Size: 21½in. wide × 16in. deep × 34in. high.

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With Cathedral Glass Front,

Price, **£2 15s.**

Splendid Patterns of Square and Hexagonal Lamps in Stock. Write for Lists.

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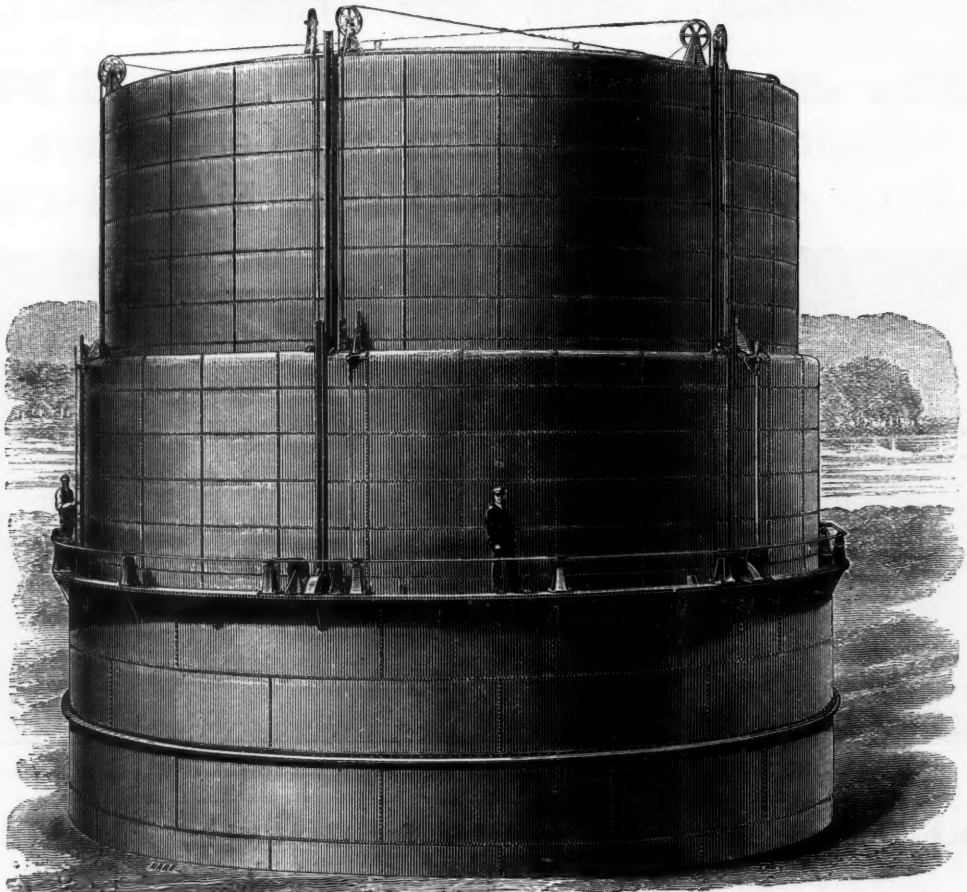


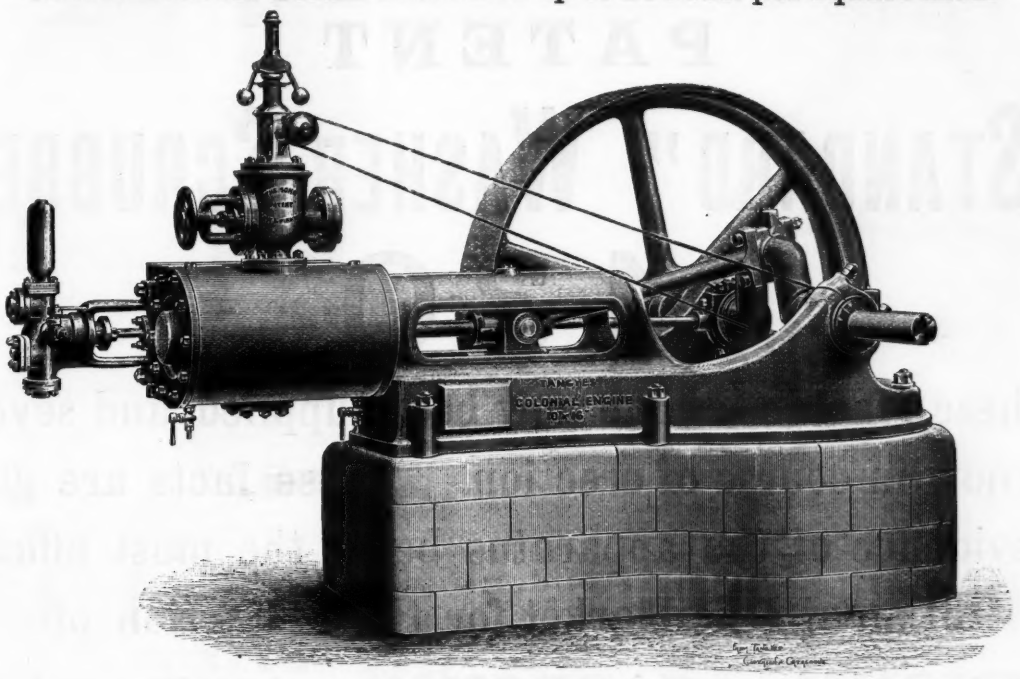
TWO-LIFT GASHOLDER, WITH TANK, WORKING WITH PEASE'S PATENT WIRE-ROPE SUPPORTS.

(From Photograph.)

TANGYES'

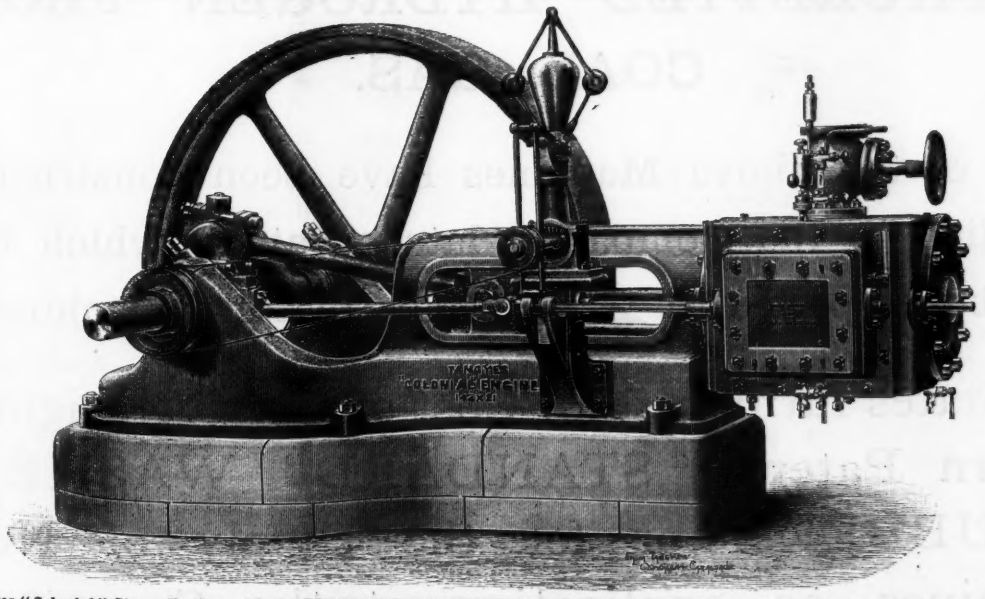
"COLONIAL" STEAM-ENGINE

Constructed for Steam Pressures up to 100 lbs. per square inch.



From a Photograph of the 10½in. by 16 in. size, with Feed Pump.

Steam Cylinder, diam. .. .. ins.	4½	5½	6½	7½	8	9	10	12	14½
Stroke, length .. .. .. ,,	7	8	9	9	12	14	16	18	21
Revolutions .. .. per min.	250	225	200	200	150	140	125	116	100



Tangyes "Colonial" Steam-Engine, with the TANGYE-JOHNSON PATENT AUTOMATIC CUT-OFF GEAR. From a Photograph of the 14½ in. by 21 in. size.

Steam Cylinder, diam. .. .. ins.	8	9	10	12	14½
Stroke, length .. .. .. ,,	12	14	16	18	21
Revolutions .. .. .. per min.	150	140	125	116	100

PRICES FOR ANY GIVEN SIZE QUOTED ON RECEIPT OF THE NECESSARY DATA.

TANGYES LIMITED, CORNWALL WORKS, BIRMINGHAM;

AND LONDON, NEWCASTLE, MANCHESTER, GLASGOW, SYDNEY, MELBOURNE, JOHANNESBURG, GENOA, BILBAO.

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KIRKHAM, HULETT, & CHANDLER,

LIMITED.

(SIDNEY HERSEY, Managing Director.) (J. CHANDLER, Engineer.)

PATENT

"STANDARD" WASHER-SCRUBBER.

430

of these Machines have now been supplied, and several are now in course of erection. These facts are given as evidence of the apparatus being the most efficient of any in the Market for the extraction of

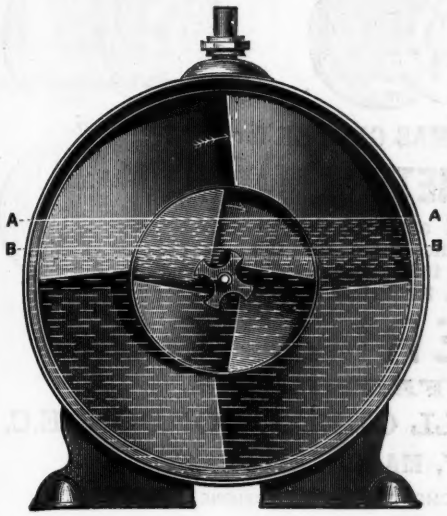
AMMONIA, CARBONIC ACID, AND SULPHURETTED HYDROGEN FROM COAL GAS.

50 of the above Machines have been constructed according to the Company's latest Patent, which has also been applied to **25** original pattern Machines.

Estimates furnished for Cost of altering original pattern Patent "STANDARD" WASHER-SCRUBBERS, or for the supply of New Machines, on application at the Company's Offices,

3 & 4, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.

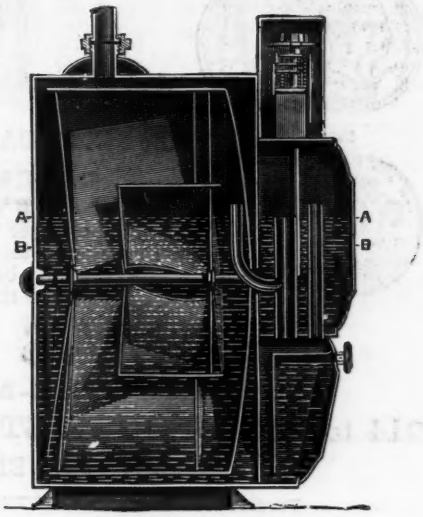
THE WARNER AND COWAN METER.



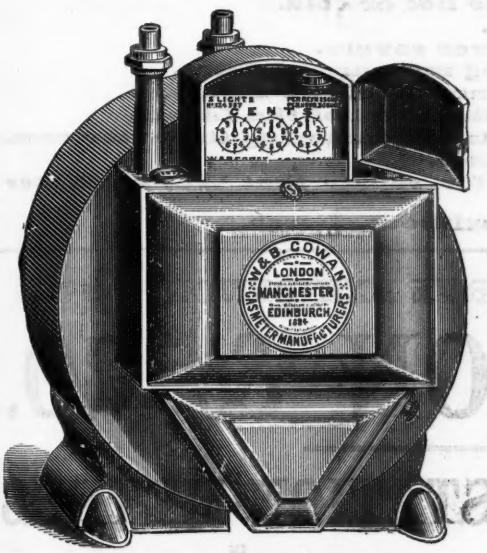
A A, High-Water Line.

B B, Low-Water Line.

Drum in Case. Hollow Cover removed.



Sectional Side View of Meter.



Elevation showing Tin Case Meter.

Elevation showing Cast-Iron Case Meter.

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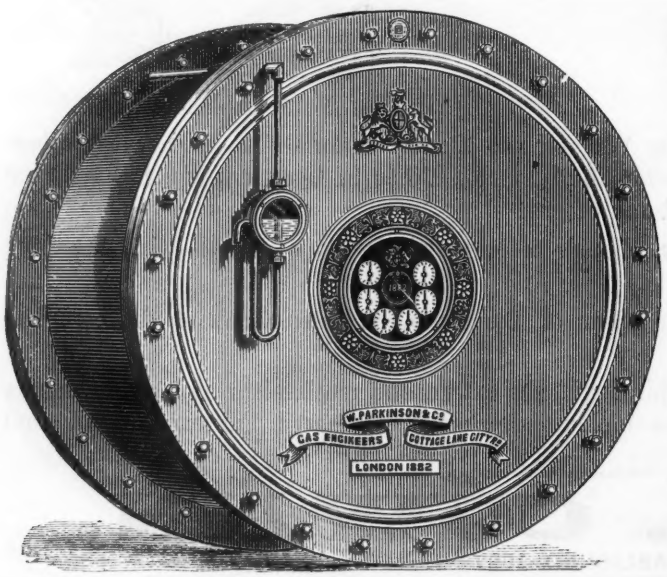

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[See also Advt., p. 828.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 3, 1891.

The Unification of Gaslight and Coke Stocks.

WHEN the City Editor of a cheap evening newspaper has two or three turns at the financial aspects of a particular stock, it naturally means that something has happened to direct his attention to that species of investment. The appearance of The Gaslight and Coke Company in this way as the subject of discussion in the "Stock Exchange "and City Notes" of the *Echo*, is hardly matter for much surprise, after the recent oscillations in the value of this Company's stock. No City Editor of a daily newspaper would, indeed, be doing his duty to his public if he were to pass over such a remarkable incident without comment, and as fair explanation of the facts as his information might enable him to offer. There are, however, comments and comments. It is one thing to notice a transient spasm of speculation in a Company's stock, and quite another to make such a movement an excuse for a detailed disquisition upon the capital arrangements of the undertaking, leading up to a definite programme of reconstruction. Yet this is exactly what the City Editor of the *Echo* did in the course of last week; and seeing what has thus been done, we have formed the opinion—which may, of course, be wholly erroneous—that this suggestive way of criticizing the capital arrangements of The Gaslight and Coke Company was "inspired." At any rate, whether inspired or spontaneous, the treatment of this subject in the *Echo* is so well informed, and the financial policy advised for the Company is so clear, and supported by such precise arithmetic, that we shall not offer any further excuse for paying very close attention to the matter. To begin with, we are reminded that Gaslight and Coke Ordinary "A" stock has experienced a fall this year of as much as 32 points—say, from 252 to 220. Since the amount of the issue is a little more than £5,470,000, at 252 the market value of the whole is £13,784,400. At 220 the same stock is worth only £12,034,000; thus showing a shrinkage in value of £1,750,400. Our contemporary sagely observes that this may mean much or little. As a matter of fact, we know that there is no sufficient reason for it. The only intelligible cause assigned for this depreciation in a typical gas stock—electric lighting progress—is mentioned simply to be dismissed as insufficient. After conceding the point of the essential substantiality of Gaslight and Coke property, the *Echo* goes on to observe that "a "reform might with great advantage be made in some "consolidation of the various stock issues." Here is where we first discover an indication of Horseferry Road influence.

Having primed his readers with this hint, next day the *Echo* financier proceeded to unfold a scheme so beautifully complete, that it is hardly possible to regard it as having been concocted, in a disinterested City reporter's chair, in order to assist in rehabilitating the particular kind of stock upon which it is based. It is proposed to "consolidate and reorganize" The Gaslight and Coke Company's capital, with a view to benefiting "both "investors and shareholders." We should have thought these terms very nearly synonymous; but perhaps there is a distinction between their meanings perceptible to the stock-jobbing mind. To proceed, however. It is observed that in the Stock Exchange "Official List" there are quoted no less than eleven different issues, ranging in amount of stock from £30,000 to £5,470,000, "each one, if possible, more unmarketable than "the other." This is a perfectly legitimate point; the explanation being, of course, that every separate denomination of Gaslight and Coke stock represents a separate guarantee to proprietors of capital taken over in connection with some one or another of the many amalgamations which have gone to the building up of the Company. It is true that some of these issues, being of small amount, are not very marketable. But then, again, they never were more so originally; and they cannot have suffered in this respect since they became classified with other Chartered obligations.

However this may be, the multiplicity of denominations of Gaslight and Coke stocks is indubitably objectionable on general grounds; and the suggestion ventilated in the *Echo* is that the whole amount of the Company's capital should be divided, first of all, into two grand classes, one of which would be a unified three per cent. irredeemable debenture stock, to represent the existing £2,264,000 in three distinct issues of debenture stock. With regard to the other kinds of stock issues, at present defined by the letters of the alphabet from A to K inclusive, the *Echo* financier works out their respective market values in tabular form, taking the current prices; and in this way (including the debenture stocks) he shows that the officially quoted amount of £10,528,640 now standing as the nominal capital, would be worth £20,609,490. It is then suggested that the capital of the Company "might "be increased to £20,000,000 nominal, and issued to the "present proprietary in the following form":—

£3,500,000	of 3 per cent.	perpetual debenture stock at 90	= £3,150,000
£3,500,000	„ 4 „	perpetual preference stock at 112	= £3,920,000
£6,500,000	„ 4 „	ordinary preference stock, cumulative within one year, at 100	= £6,500,000
£6,500,000	„	deferred stock, valued at (say) 109	= £7,039,490
£20,000,000			£20,609,490

The sum works out splendidly. It is not indicated under which class future issues would be ranked; but it will be

noticed that this redistribution of capital obligations is after the Bristol patent, slightly improved, and has the grand advantage that no class of capital would appear before the public as earning more than 4 per cent. The idea is, of course, that the allegation of "bloated dividends" would become impossible under such a re-arrangement, and that the notion of insecurity proverbially attaching to big profits would die away.

The above suggestion is ingenious. It is probably one of many that might be unearthed from the recesses where Mr. J. Orwell Phillips, the able Secretary and General Manager of the Company, keeps his memoranda. Possibly a stray leaflet from these files may have found its way accidentally to the City Office of the *Echo*. We can far more easily believe that the present scheme, if it can be truly so called, originated at Horseferry Road than that it was evolved from the inner consciousness of a City Editor, whose chief care must be devoted to watching the movements of much livelier classes of investments than gas stocks. There is a smack of the gas office about all the affair. In his recommendation of the dilution of stocks with the object of drawing small investors, including "consumers and employees," we seem to see the curious spectacle of a City Editor writing under the hypnotic influence of some thoroughly well-posted person who knew what is being done in this direction by the South Metropolitan Company, but deemed it advisable to avoid all mention of an experiment which does not altogether bear out the contention that "stocks standing at such excessively high prices as those of The Gaslight and Coke naturally repel rather than invite investors." It is interesting to note how suggestions of this order originate and spread. We shall not discuss the *Echo* production on its merits. It has merits, of course, even if its cleverness leans more to the side of cunning than to that of wisdom. It is all very well to send up trial balloons of this sort to discover the direction of the prevailing wind; but if the idea is to "square" the London County Council, it was a strange oversight to select the *Echo* in preference to the *Star* as the agency for making the first advances. If a scheme of the kind ever comes before Parliament, there will be a good deal to say for and against it; and, in the meanwhile, we merely reproduce the suggestion for what it is worth.

An Oldham Gas Case.

A NOTABLE lawsuit is in progress between the Corporation of Oldham and the out-townships supplied with gas from the Corporation works. The dispute, which was mentioned in our news columns several times during the past half year, has arisen out of what we can only describe as a piece of sharp practice on the part of the Corporation, which lays them open to the charge of squeezing more for themselves out of the latest parliamentary settlement of the local gas question in 1886 than either the Legislature meant them to have, or than the other parties to this settlement contemplated at the time. The facts are simple enough. The Oldham Act of 1886 was only secured at a great price; the opposing authorities succeeding in procuring the removal of the power previously enjoyed by the Corporation of charging differential rates as against the out-townships, and also in curtailing the profits realizable by the Corporation to something like an ordinary statutory gas company's dividend. This alteration of their powers, which the Corporation were compelled to accept, was taken particular notice of at the time as signalizing the beginning of a new policy on the part of the House of Lords with regard to gas-supplying municipalities. It was interpreted to mean that, when a municipality supplies gas to independent local self-governing areas, it must expect to be laid under the same restrictions as to profit, &c., which would apply to a gas company similarly situated. The Oldham Act of 1886 lays down, among other conditions, that gas shall be supplied to the outlying districts of Chadderton, Royton, Crompton, and Failsworth, at the same price as may be charged for the time being in Oldham; and also that when a certain proportionate amount of profit has been made, the price of gas is to be reduced. Whereupon, Oldham resolved to supply gas gratis for lighting its streets and municipal buildings—a step which the out-townships regard as contravening in spirit, and perhaps also in fact, the principle of equal treatment for all consumers of Oldham gas supposed to be enacted by the Act of 1886. It so happens that, by an Act of 1865, the Corporation are entitled to supply gas gratuitously for any purpose of "public advantage;" but they never put the street lighting into this category, to act upon it, before 1887. It is therefore not to be wondered at that the outlying townships think themselves hardly done by in the matter, or that they should have invoked the law to constrain the Corporation to charge their street lighting in the ordinary way, upon the ground that removing the value of the gas consumed for this purpose from the gas accounts is against their interest in the undertaking as defined by the Act of 1886. The action reached the conclusion of its first stage on Thursday last, when Mr. Justice Henn Collins decided in favour of the Corporation. The decision of the learned Judge rested upon the permission given to the Corporation by their Act of 1865, which was incorporated in the Act of 1886, to supply gas gratuitously for any purpose of public advantage. He held that street lighting is unquestionably a purpose of public advantage, and that therefore the Corporation have acted strictly within their legal right in refraining from bringing into their accounts the value of the gas consumed in the street lamps. This is perfectly reasonable, so far. The Judge had only to expound the Acts as he found them. It was no part of his duty to draw any moral from the coincidence of the outburst of public beneficence on the part of the Oldham Corporation, with the clipping of their powers for making neighbouring townships pay a premium for the privilege of being supplied with Oldham gas. It appears to us, however, that when he went on to say that this action of the Oldham Corporation does not injure the out-townships, the Judge took a one-sided view of the relationship between the parties. Surely, if a partner of a business concern, in which others have a profit-sharing interest, chooses to give away an article of the firm's manufacture, he injures them by preventing the earning of profit upon the sale of this article. In the present case, we incline to think that, while Oldham might, under the Act of 1865, still give gas to a public fountain, or even to a hospital, there exists a very plain distinction between such gratuities and the "grabbing" of the whole of the street lighting gas, before its value is included in the accounts upon which the interest of the other parties to the undertaking is determined. There will, of course, be an appeal. A question of this sort is too important to be allowed to rest upon the dictum of a single Judge. These disputes between municipalities and local authorities should afford instructive reading to those perfervid worshippers of local self-government who seem to believe that popular representative bodies can do no wrong. Somebody once said that the liberty of any individual only ends where that of another individual begins. So it is, perhaps, with Corporations; but the application of these high-sounding phrases to particular instances is famous work for the lawyers.

The Kershaw Trial.

THE trial of Mr. Sydney Kershaw, coal merchant, of Salford, for an alleged attempt to bribe the Gas Engineer of the Salford Corporation, took place at the Central Criminal Court on Tuesday last, before the Recorder of the City of London, and resulted in the Jury disagreeing; whereupon they were discharged, and the recognizances of the defendant were enlarged to the next sessions of the Court. In all probability the prosecution will be stayed before this time; and it is devoutly to be hoped that nothing more will be heard of the matter. The circumstances of this affair are too well known to require explanation here. We have no desire to exaggerate the importance of Mr. Kershaw's indiscreet act; and still less do we wish to discuss Mr. Shoubridge's conduct. It is to the coal contractor's credit that he did not deny Mr. Shoubridge's report of his proceeding, nor did he complain of the action of the Corporation thereupon. On the contrary, he confessed his error, and threw himself on the mercy of those whom he had offended. His candour in this respect probably weighed with the jury, and induced some of them to take the more lenient view of his action which prevented a conviction. Mr. Shoubridge, on the other side, as a new comer in Salford, was placed very awkwardly between the course which good nature would have prompted, of saying nothing about Kershaw's error, and that of reporting it to his Chairman. That he is, in practical matters, a good-natured man, abundantly appears from Kershaw's own statement. He is not one of those rigid persons who regard a contractor as an

engineer's natural enemy, but is ready and willing to accommodate a well-meaning tradesman in the little matters which mean so much in the execution of a contract, while they have no effect upon the net result. Unfortunately, the man who is habitually kind and considerate in such matters is the very first to be accused of venality by a disappointed contractor. The history of the gas industry does not want examples of rival traders going out of their way to blacken the characters and injure the prospects of gentlemen whose goodness of heart they have been incapable of understanding. It is unnecessary to do more than hint at the recollection, which all British gas engineers have only too much cause to keep fresh, of instances of gentlemen as amiable and as honourable as Mr. Shoubridge, who have been made, by rabid traders, to suffer all the injuries that spite and jealousy could suggest. At any rate, after Mr. Shoubridge had repelled Kershaw's advances and dismissed his compromising visitor, he took the course he did as the best way out of what might have proved an embarrassing position. If he had been inspired with the desire of gibbeting Kershaw, he might have trapped him by provisionally accepting the much-talked-of envelope, and either sending it straightway to be opened by the Town Clerk or the Chairman of the Gas Committee, or handing it over to the custody of a clerk, to be produced at the next meeting of the Committee. Let us hope that the Salford Town Council will now refrain from further stirring up an essentially unsavoury affair, and that the lesson which it was necessary to give, in the person of Mr. Kershaw, to the Corporation contractors in general, will not need to be repeated.

Trade Union Folly at Darwen.

A VERY fair example of the plentiful lack of wisdom that governs the counsels of modern Trades Unionists has come into prominence at Darwen; and we tell the story for the sake of its moral. It appears that Mr. T. Duxbury, the Manager of the Darwen Corporation Gas-Works, was accused, at a recent meeting of the Town Council, of the heinous offence of refusing to employ native labour in the works, and of entertaining a dislike to Union men. There is nothing your model Trade Unionist abhors so much as to be done by as he likes to do himself. It is notoriously, in his estimation, the height of public virtue to refuse to work with non-unionists; but if anybody objects to him on account of his Unionism, he cries like a spoiled child. Consequently, he and his flatterers, the Town Councillors who live by the "popular vote," took to saying unpleasant things in public of Mr. Duxbury, who is well-known for making no distinction between unionists and non-unionists in the works under his control. It must be a hard matter to put up with the unionists; but Mr. Duxbury does it as well as he can. He was spurred to defend himself by what was said behind his back in the Council meeting; and now his assailants must wish they had held their tongues, for he has made them and Unionism look particularly foolish. The myth about his objecting to native labour and to unionists originated in the following circumstances: He wanted half-a-dozen bricklayers for some job in the gas-works; and he sent to a representative man of the craft, to whom he told his requirements, offering the full Union rate of wages, for regular work under cover, with no broken time and some overtime. He was informed that the matter must go before the Bricklayers' Club, who decided that none of the members of the Club should be allowed to undertake the job, and that no Union men from other towns would on any account be permitted to come in and do it. Nothing daunted, Mr. Duxbury sent to Manchester for free men. But before these actually started, he bethought him to communicate with a local builder and contractor, with whom he arranged for the execution of the work; and the Union actually allowed its members to go into the gas-works for this middleman, while they were not to do so for the Gas Committee direct! Could there possibly be a more glaring piece of foolery than this? And yet these are the luminaries who are to reorganize the science of Political Economy and start the Millennium upon the footing of New Unionism. It might be thought that no such monumental idiotcy as this Darwen performance could be perpetrated except under the orders of Burns, Mann, Tillett, and Co. We understand, however, that not one of these distinguished public characters was present in Darwen on this occasion. It is clear, therefore, that their propaganda has not been carried out in vain, but that henceforth, wherever a dozen or so of Trades Unionists, satisfactorily imbued with the "new" principles, can be found, they may be trusted to make as complete fools of themselves as though they had the entire strength of the Executives of the Dockers' and Gas-Workers' Unions to help them in the effort.

WATER AND SANITARY AFFAIRS.

THE report of the County Purposes Committee of the Corporation on the subject of the Metropolitan Water Supply, gave rise to a long and heated debate in the Court of Common Council on Thursday last, followed by an adjournment to yesterday. It at once appeared that the proposals of the Committee, though in general accordance with the recommendations of the Select Committee of last session, were not such as would be acceptable to the County Council. The Corporation Committee proposed that a Bill should be introduced in the next session, to confer statutory powers upon a Joint Committee of the Corporation and the London County Council, and to authorize that Committee to give notices to treat to the Metropolitan Water Companies within four years; the giving of such notices to be obligatory at the close of that period. The Bill was also to provide for the appointment of a tribunal to ascertain the price to be paid to the Companies, such tribunal to have the fullest powers of inquiring into all matters relative to purchase. It was to be provided that the undertakings should be paid for by means of stock, having the ultimate security of the county rate. Making purchase the first step was evidently a proposal contrary to all the policy of the County Council on this subject. But the Corporation Committee, if we may judge from the remarks of Mr. Rose-Innes, were influenced by a conviction that Parliament would only give the necessary powers where a purchase clause was included. Mr. Rose-Innes declared that "without such "purchase clause, the water question was insolvable." The dilemma thus showed itself—the Corporation seeking to meet the views of Parliament, and at the same time to please the County Council. As to the terms and method of purchase, we may direct attention to the interesting letter which appears in another part of our columns; the writer being one well qualified, by position and experience, to deal with the question. But purchase in any form is a transaction which the County Council seems determined to render as difficult and remote as possible; and our correspondent appeals to the Corporation to take up the matter vigorously, so as to put an end to the prolonged suspense. However, the Corporation decided at their meeting yesterday to join hands once more with the County Council. The report presented on Thursday was thrown overboard, and a fresh report adopted, by which it is proposed for the two authorities to unite in re-introducing "the agreed Bill of last year." The four years' limit for purchase is abandoned. By "the agreed Bill" we presume is intended the formation of a Statutory Committee with certain powers, according to the plan arranged between the Corporation and the County Council last May.

The defiant attitude taken by the County Council towards the Metropolitan Water Companies, is exhibited in what is doubtless considered to be a crushing report just issued, addressed to the Special Committee on Water Supply, by Mr. A. R. Binnie, the Council's Engineer. This report is intended to embody the information contained in the various reports ordered by the Committee, together with other information of recent date, bearing on the question of obtaining a further supply of water from the Rivers Thames and Lea. The report is accompanied by two coloured maps—one showing the geology of the Thames and Lea basins above the intakes of the Water Companies, and the other indicating what are called the sources of pollution. We are not disposed to deny the ability with which the report is drawn up, though we cannot agree with its conclusions, or approve the manner in which some of the facts are presented. With the final paragraph we are decidedly at issue, where Mr. Binnie—as on a former occasion—indulges in a species of prediction, saying: "It is evident that the "inhabitants of London are living under conditions as to

"their water supply which might lead to an outbreak of "epidemic disease that, for extent and severity, would "be almost unparalleled in the history of the world." Mr. Binnie makes numerous references to the report presented in 1869 by the Royal Commission presided over by the Duke of Richmond. But among his quotations we have failed to find one where the Commissioners say: "We are of opinion that there is no evidence "to lead us to believe that the water now supplied by the "Companies is not generally good and wholesome." As for any falling off in the quality of the water since that date, we may refer to Dr. Frankland's report for last year, showing the maximum amount of organic matter in the London Water Supply, as derived from the Thames and the Lea, during the years from 1868 down to 1890, both inclusive. It is there recorded that the maximum amount of organic contamination was never lower than during the past year, and only in one year (1884) was it so low. In earlier years we find it to be very much higher. The report for 1889 was nearly as favourable as the last. Mr. Binnie himself says: "At present, no doubt, the death-"rate of the Metropolis is low; and, as far as analysis "is concerned, the water appears to be wholesome." "But," he goes on to say, "it has been shown that "analysis, without the previous history of the water is "taken into account, is no guarantee of purity." Yet assuredly we cannot dismiss such evidence as that which is afforded by a marked improvement in the results shown by chemical analysis and by a low death-rate. What guide can we find, if chemical analysis is to afford "no "guarantee" of quality, even when accompanied by an eminently satisfactory state of the public health?

Mr. Binnie takes considerable pains to show how manifold are the sources of pollution existing above the intakes of the London Water Companies; and he avails himself of Dr. Percy Frankland's paper, read before the recent International Congress on Hygiene and Demography, in order to disprove the self-purifying power of a flowing stream. At the time this paper was read, we remarked that the results necessarily failed to show the entire character of the water—the analyses being limited to the dissolved organic matter; while it was admitted that the removal of suspended matters by sedimentation during the flow of a river was beyond dispute. Moreover, it was stated in the paper that the Thames, after a long flow through a cultivated and fairly populated district, often reached London "in a surprisingly pure state." On the question of quantity, Mr. Binnie draws as dark a picture as he does with reference to quality. Here he has a little difficulty with the Royal Commissioners who reported in 1869; it being their opinion that 110 million gallons of water per day might be "safely drawn" from the Thames in its then existing state, and further "that, "by means of proper works for storeage, this quantity "might be doubled if required." The contemplated volume of 220 milllon gallons per day would exceed the daily average taken from the Thames, the Lea, and all sources last year, by as much as 44 million gallons. But Mr. Binnie considers that the Commissioners over-estimated the minimum flow of the river. He also questions the legality of the arrangement by which the Thames Conservators have authorized the five Companies to enlarge their draught by as much as 20 million gallons per day in the aggregate; thus bringing up the total quantity to 130 millions, including 10 millions previously authorized by Parliament in the case of the East London Company. The actual quantity taken from the Thames last year was about 90 million gallons per day. Treating of the Lea, Mr. Binnie considers the whole district as already drained to the uttermost by the New River and East London Companies. He also holds a decided opinion that storeage reservoirs could not be constructed either in the valley of the Lea or the Thames. A supply drawn from the gravel beds is objected to, as depleting the streams, and as being subject to pollution. Nearly the same is said of the chalk wells. All these things, and sundry others, are to be taken into consideration when debating the terms on which the undertakings of the Water Companies are to be purchased. Still, there are two stubborn facts to be faced: The supply is at present adequate; and there is nothing to show that its use is in the least degree hurtful to the public health. Surely there is a "fad" on this water question and one which may prove extremely costly.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 813.)

THE past week has been rather a dull and quiet one in the Stock Exchange. There was nothing to move the markets either way to any perceptible extent, though perhaps the Foreign market evinced more than the average animation. Prices consequently remain without much alteration. In view of yesterday being a close holiday, business dwindled down very much towards the end of the week. The demand from abroad for gold, induced the Bank of England Directors to put the rate up to 4 per cent. (it having stood at 3 per cent. for the preceding five weeks), which produced no dissatisfaction. In fact, a 4 per cent. rate is about the most popular rate all round which can be had. Business in the Gas Market was quite up to a good fair average. Of course, the quick recovery in prices effected after the scare led to a little selling to realize profits; but, on the whole, quotations may be regarded as pretty steady. Gaslights have naturally been by far the busiest. The "A" is quoted 1 lower; but the figures marked have been very level every day. The opening bargain was at 220; and the last was 220¾, with no very wide divergence in the course of the week. A fair amount was done in the secured and limited issues at moderate prices. Nothing was done in South Metropolitans, except on Monday, when two or three parcels changed hands at about the old rates; and a bargain in the debenture stock being done specially at 141½, the buying price was put down 1. Small business was done in Commercials at an advance of 5 in the price of the old stock. The old and the new stocks now stand at the same value. Business in Suburbans and Provincials was very quiet and quite featureless; all quotations remaining unvaried. The Bristol Company have passed a resolution authorizing the conversion of their capital into double its nominal amount at half its rate of dividend—*i.e.*, the substitution of £200 stock bearing a 5 per cent. dividend, in lieu of £100 stock bearing a 10 per cent. dividend. The Continental Companies show a downward tendency. Imperial Continental have receded 1, although the prices realized did not show much falling off. Europeans were more freely offered, and declined 1 for the fully-paid, and ½ for the partly-paid shares. None of the rest presented any matter of interest, except Buenos Ayres, the debentures of which rose 1½. Water stocks have been very quiet and tolerably firm, with the exception of Southwark and Vauxhall, which fell 5.

The daily operations were: Business in Gas was only very moderate on Monday, and prices generally were only fair, though Commercial old rose 5. European and South Metropolitan debentures fell ½ each. Tuesday was a quiet day, and prices of what few issues were dealt in were fairly maintained. Buenos Ayres debentures rose 1½. Wednesday was about upon a par with the preceding day; the only feature being an easier tendency in Europeans. Thursday's movements were adverse, though business all round was very limited. Gaslight "A" fell 1; and Europeans of each issue, ½. Friday's dealings were all in Gaslights and Imperial Continental. The former held firm; but the latter declined a point. Southwark water fell 2½. Saturday was the usual quiet day, and presented no salient feature. All Gas issues closed unchanged; but Southwark water fell 2½ more.

ELECTRIC LIGHTING MEMORANDA.

Electric Lighting for the Offices of the London County Council—The Lighting of the Naval Exhibition—Electric Light Rentals—Rope Traction v. Electrical Tramways.

THE subject of electric lighting for the offices of the London County Council has been under discussion by this august body; and it has been decided to extend the system already in partial use to the whole building, at an estimated cost of £1500. This can only mean the bare cost of wiring the rabbit-warren in Spring Gardens which the County Council inherited from the Metropolitan Board of Words. The current will have to be bought from outside; and it is significant of the businesslike methods of the Council that nothing was said about this in the report of the Committee which recommended the extra expenditure on electric light fittings. Something was mentioned about the opinion of the Medical Officer to the Council regarding the "injurious effects of gas;" and it appears to be this gentleman's view that clerks can be packed closer in electrically-lit rooms than where gas is burnt. Moreover, the Medical Officer cited Mr. Brudenell Carter as having stated that no prejudicial effects are produced by the electric light upon the eyesight of clerical workers; and the Chief Engineer (Mr. A. R. Binnie, M. Inst. C. E.) has added to all these recommendations of the electric light the important consideration that, as there is nothing in it to blacken ceilings and walls, its adoption will probably lead to a saving in the somewhat heavy expenditure for annual cleaning. Nobody seems to have questioned any portion of this report; and therefore it does not appear by how much the lighting bill of the establishment is likely to be increased, or what degree of overcrowding of the offices the electric light is calculated to permit, or how deep a coating of London dirt is to be endured by the officials before cleaning of the walls and ceilings is held to be necessary.

The Naval Exhibition, which has just been closed, was one of the most successful of its class, not merely because it was well patronized by the public, but also because it was, on the whole, very sensibly managed. In nothing was this businesslike faculty of the management better displayed than in the matter of the lighting of the grounds. It will be remembered how, in connection with the South Kensington series of exhibitions, the fruit of which is to be the Imperial Institute now in course of building, the lion's share of what would have been profit was taken by the electric light contractors. This was markedly the case with the Inventions Exhibition, which was largely controlled by a group of celebrated engineers, who succeeded in squandering many thousands of pounds to no earthly advantage, with the object of demonstrating the capabilities of incandescent electric lamps for public illuminations, &c. They demonstrated to such a tune, that nothing of the kind has been possible since, and they were ashamed to say what their little experiment cost. At any rate, Great George Street had nothing to do with the lighting of the Naval Exhibition. There were plenty of electric lamps to be seen there; but they were nearly all arcs, and disposed in the grounds and galleries to give a useful effect. The search-lights flashed all over the heavens from the Chelsea grounds were considered a nuisance by dwellers in the neighbourhood. But they were not worked late into the night; and Chelsea does not retire to its slumbers very early. The great revolving light from the model Eddystone was a conspicuous feature of the show—being visible from far and near. Altogether, the exhibition was a good example of the part that electric lighting is capable of playing in connection with displays of the kind, when nothing is spared to produce a brilliant effect, and at the same time a reasonable discretion is exercised over the character of the lighting arrangements. As usual, the electric lighting machinery was one of the greatest drawbacks to the whole thing, on account of the steam, noise, and fuss unavoidable in connection with the intrusion of powerful steam-power plant into what should be a pleasure resort; but this cannot be helped in such circumstances.

There are several different systems of charging for electric lighting supplied by central station companies, although in London, and wherever the number of lamps used by a consumer is large, meters are taking the place of the hap-hazard rental methods. In small country towns, such as those in the West of England affected by the Massingham Syndicate, the business done is hardly heavy enough to require meters, which are still comparatively expensive luxuries. In these circumstances it is customary to charge shopkeepers rental after the rate of 1s. per candle per annum for all lamps; the user bearing the cost of renewals. Thus a 16-candle lamp costs 16s. a year; a 32-candle lamp, twice as much; and so on. If a lamp lasts six months, renewals mean an extra 7s. 6d. per lighting point per annum, irrespective of the illuminating power, out of which the supply company get no profit. The service is laid up to the door by the company, who usually do the interior fitting, of a plain kind, for 30s. per point. There is not much money to be made at these rates. Even when the profit on a modest share of the street lighting, by means of arc lamps, is added to the total revenue, there is a good deal left to be desired in order to make both ends meet, to say nothing of other than ordinary working expenses.

Notwithstanding all that has been published about the prospects of electrical traction, a good deal is being done in increasing the mileage of cable tramways. A big scheme of this kind is being carried out in South London, for which the electrically-worked subway only partially provides the means of cheap and rapid locomotion. This subway does not pay yet, by the way; and the management are trying, by various expedients, to increase its earning capacity. It is only for traffic requirements of an exceptional kind, however, that a subway can be said to be an acceptable sort of accommodation. Surface tramways must always be the most general means of assisting traffic; and it is here that electricity most conspicuously disappoints its partisans. Rope haulage, on the other hand, seems to be gaining ground, not only in England, but also in New York, where we have been led to believe that electricity does everything that is done in this benighted island by coarser mechanical means. The great economical drawback to a cable tramway is, of course, the weight and length of the rope, which has to be hauled along at a regular pace, whether it is doing profitable work or not. The idea that the electrical transmission of power cannot compete with this extravagant method of conveying motor energy from a stationary engine to a tramcar, is something that the general public, with the vague notions that prevail respecting the capabilities of electricity, may find a difficulty in understanding. We are sorry for it, because, as we have often remarked, we should like to see a wider field than lighting opened out for the utilization of high-power electricity. But facts are stubborn things; and the cable tramway is a fact that it would puzzle even Mr. Preece or Professor Forbes to twist into a compliment to our modern electricians.

"Lightning."—A new publication, which professes to be "the popular and business review of electricity," has made its appearance under the above title. The contents of the first number are of a somewhat mixed, not to say trivial character. As is now customary with new ventures, prizes are offered for competition.

EXPERIMENTS UPON NEW PROCESSES.

The report which appeared in last week's issue of the JOURNAL upon the Swan Village experiments with the Elliott process of continuous coal carbonization, for which the whole profession of gas engineering is indebted to Mr. Henry Hack, suggests a good many reflections upon the general subject of practical trials of new systems of gas manufacture. A year seldom passes over our heads without bringing its novel problem for the gas manager who wishes to do his duty to his employers by keeping his practice up to the standard of his epoch. If the project is not concerned with coal carbonization, it is something in connection with purification, or carburetting, or handling coal, or some other matter which is of great importance in every gas-works in the kingdom. Of course, there is one way of dealing with every such suggestion, which is to "let somebody else try it first;" and this is the line taken by the rank and file of gas managers, who are neither better nor worse in this respect than the bulk of other orders of technicians. In all industries there is a majority of men who dislike change. They do not all go so far as to argue that the established routine is the best conceivable; but they are content with it, and freely confess that it is "good enough for them." Fortunately, there are many exceptions to this rule; and it is not difficult to find technicians who will look into a novel system upon its merits. This class of man scorns the protection of the plea advanced by his weaker brethren; and, so far from wishing to see a strange suggestion carried out in the first place by somebody else, he has his own opinion on the subject, and can advance reasons for or against a trial of the novelty by himself or by any other independent person. If the notion appears to him to be worth trying, he is willing to try it—circumstances permitting. If he does not like it, he usually makes no scruple about saying so.

Although, so far as his own tastes are concerned, an able and enthusiastic gas manager might be happy to try experiments all day long—to live in a world of experiment, so to speak—he must obviously curb his desires in this respect. We hold that every gas manager ought to have his experimental gas-works, the scale and character of which may depend upon those of the undertaking of which he has charge. In a large establishment, the experimental plant may be a complete manufacturing station, or a self-contained section of the main works capable of being "switched off," as an electrician would say, in order that what is going on in the way of coal carbonization, purification, or what not, may be taken more precise account of than is necessary in the ordinary processes of gas manufacture in bulk. But the gas manager with the most limited opportunities can always provide himself with a little home-made experimental plant, if his tastes lie that way, which will enable him to find an answer for many questions that would puzzle him sadly in default of some such aid to inquiry. Experiment, however, when it has to do with more recondite matters than the comparison of coals, the valuation of purifying materials, and so forth, is apt to be a thankless as well as a troublesome thing, unless entered upon with sufficient means of obtaining a definite result, and with a clear understanding as to what experiment is expected to prove.

The gas manager is not to be envied who admits into his works a rabid process-monger. It is necessary to exercise the greatest caution in settling beforehand the terms upon which a crucial experiment in gas-making is to be tried in an ordinary gas-works. This may be said of experiments in other branches of technics, such as railway working or ship building; but experience shows that gas-making processes are so often designed to serve as excuses for financial "operations," that an amiably-disposed gas manager may be drawn into all sorts of unforeseen complications unless he is particularly careful to protect himself by ample safeguards. It is no light thing for a gas manager to assume the position of judge of a strange process. He puts himself on trial at the same time, because his methods of experimenting and arriving at the bases which he regards as necessary to the formation of a reliable judgment mark his own grade as a technician.

Indeed, there is nothing that so certainly reveals a professional man's quality as his manner of reporting upon a novel system submitted to his judgment. Many engineers prudently decline to commit themselves to a written report, and convey their opinion in the form of a statement to the effect that the results of experiment are satisfactory or the reverse. A good deal depends, of course, upon the circumstances of the trial. If an inventor approaches a gas manager with a request for a trial of a process or a machine, it may be that the manager can agree that the results of the test, if satisfactory, will be of such immediate value to his employers as to warrant him in offering to recommend them to bear all or part of the expenses of the experiment, provided a *primâ facie* case can be made out for the idea, and certain antecedent conditions can be mutually agreed upon. Thus, taking the case of a carbonizing system which is claimed to add a couple of candles to the illuminating power of the gas from a known kind of coal, or to save something considerable on the labour account, it is open to the manager to say: "This system, if successful, will save my employers thousands of pounds yearly; and I think so well of its prospects that we will try it at our own expense"—taking

a guarantee for the consideration of this fact in the settlement of the terms of the royalty or price demanded by the inventor. In this case the manager has it within his own discretion whether he publishes his report upon the experiment, or merely communicates his opinion of the general result. The knowledge which he has gleaned respecting the working of the system belongs to his employers, who have paid for it, and the inventor is not in the independent position which would empower him to require the manager to render an account of his views, with reasons for them. The case is wholly different when the inventor pays the cost of the trial, and provides his own apparatus. Then, as it appears to us, although he cannot command a report from the superintending gas manager, who is not his officer, he may reasonably expect some consideration at the hands of his judge, such as would naturally be expressed in furnishing reasons for opinions arrived at. The most satisfactory course for the inventor to pursue is to retain a consultant—either chemist or engineer, as the case may require—whose report would be his own property to treat as he pleases.

We entertain the general conviction that, except in very peculiar cases, a gas manager who has taken up a new process experimentally, and afforded the inventor all the facilities of his works, is, in a sense, bound to disclose the results obtained. A gas manager is subject to so many imputations upon his conduct with regard to a project which he is known to have tried—he is liable to be accused of old-fogeydom, of partiality, of forming an opinion upon insufficient data, and so forth—that, for his own protection, it is highly desirable for him to avoid everything like mystery respecting the results, and the methods by which they were obtained. This also gives the inventor an opportunity of further improving his arrangements, should the verdict be unfavourable, or mercifully administers his *quietus*. It is a sad mistake to allow an inventor any justification for believing that there may be something in his ideas, while it can be made as clear as noonday that they are valueless. Inventors are proverbially the most bigoted of beings in regard to the merits of their projects, and it can rarely be that one of the tribe will rest contented to take his fate at the bare word of the ablest and most highly respected gas manager. It is doubtless the easiest way for the latter to say to a disappointed process-monger, as politely as he can, "It won't do at any price; take it away." But this is rarely sufficient. It suffices, of course, for the experiment in question; but there is nothing in such a verdict to prevent a recrudescence of the scheme in another quarter—thus entailing expense and trouble which a little more candour with regard to the results of the first trial would in all probability have saved.

Disappointment is sometimes expressed with the character of the opinions given by consultants upon gas-making projects. It occasionally happens that processes which reputable specialists have spoken well of, display an unaccountable backwardness in "coming on" practically; and, accordingly, the reporting specialists suffer more or less pointed imputations upon their perspicacity. It is very commonly forgotten, however, that specialists' reports are to be taken in the same light as counsel's opinions. In both instances the manner in which the case is stated makes all the difference to the answer. A specialist is called in, for instance, to say what a gas-making process is capable of doing. He looks into the subject, and reports the truth, if he is a respectable man, to the best of his knowledge and belief. The amount of his fee may gauge the completeness of his investigation, but it will not affect the general result. He finds (say) that the plant submitted to him is capable of producing so much gas of a particular description from a stated quantity and kind of material. This is what he was engaged to certify—no more, and no less. The practical critic, receiving the report, notices that it does not contain something he would like to know—such as the probability of the results being maintained during a lengthened period, or the possibility of confiding the control of the plant to an ordinary gas-works hand. But the specialist is in nowise to blame for not including such information in his report. No such questions were in the "case" presented to him; and therefore he has nothing to do with them, or with the order of considerations which they represent.

In view of this limitation of the purview of the specialist, some people hastily run to the other extreme, and aver that to their mind the opinion of a "practical man" is worth more than that of a chemist or a consulting engineer. When the term "practical man" is employed in this way, it generally means an ignorant person who has no idea of the nature of an exact experiment. We are continually in receipt of recommendations of gas-making processes (mostly of American origin) which quaintly display the "practical" man's notion of what is required in a testimonial in support of an inventor's claims. Here is an extract of one purporting to come from the "Master Mechanic" of a United States Railroad. It refers to a machine for mechanically mixing coal gas and air—doing for it, in short, at considerable trouble and expense, what the common atmospheric burner does automatically and for nothing:—

"I find that by its use a permanent and perfect mixture of gas and air can be obtained, and that the machine can be readily adjusted to any gravity of gas, however rich or poor, giving the exact quantity of air to ensure perfect combustion. Having over thirty years' experience in the construction and management of locomotives, I can say, with confidence, that the use of your machine realizes a great saving. By the present system of burning coal in locomotives, only 45 per cent. of the fuel used really goes to the production of steam; the other 55 per cent. being entirely thrown away, while with your invention the combustion is so complete that nothing is lost. It is well known to gas manufacturers that one ton of coal will produce 13,000 cubic feet of gas, which gas, when commingled with air by your machine, will do more railroad work than any two tons of coal. I desire also to say that I consider it safer for passengers to ride behind an engine burning this mixture for fuel than one fired in the ordinary way."

There is much more of the same kind in this testimonial; the "practical man" being apparently desirous to earn his fee by the quantity, if not by the quality of his commendations.

So that, whether we turn to the professional expert or descend to the "practical man," it is by no means easy to obtain from any single source authentic information respecting all the points of a strange manufacturing process. It is, therefore, hardly to be wondered at that busy gas managers are sometimes shy of putting themselves in a position where they are exhibited as possessing science enough to arrange a crucial experiment, and practical expertness in carrying it out. Still, this kind of work must be done; and, in the absence of anything like a central public laboratory for the gas industry, it must be done in a more or less unsystematic, hap-hazard fashion. By the most complete publication of results, however, some of the most unfortunate consequences of the lack of system in this matter—and in particular the wasteful repetition of experiments—may be prevented.

THE LAST WATER-GAS METHOD.

A PAMPHLET upon "Illuminating Water Gas, Present and Future," by Mr. Henry C. Rew, has been sent to us from Chicago. We are always pleased to receive original information on this subject; and accordingly we opened this fresh addition to the literature of the peculiarly American institution of illuminating water gas with a feeling of expectant interest, more especially as we seem to have a faint recollection of having heard of the author before. It soon appeared, however, that we could say as much of the bulk of his pamphlet, which is largely made up of a wholesale appropriation from Mr. Frederick H. Shelton's well-known paper on "Illuminating Water Gas, Past and Present," including most of the illustrations drawn for this paper, now looking generally the worse for wear. Mr. Rew evidently understands something of the practical side of water-gas engineering, since he is able to criticize the different patterns of apparatus described by Mr. Shelton. It may be noted that Mr. Rew awards the palm for superior water-gas making to the Springer improved apparatus, which he says is considered the best gas generator now in the market. Large cupolas after this pattern are in use in Chicago, and are reported to be producing enriched water gas faster and cheaper than any other apparatus known. They are credited by Mr. Rew with the duty of 30 lbs. of coke or hard coal, and 4 gallons of crude oil, per 1000 cubic feet of 22-candle gas. It may be stated here, for the information of English readers, that the Springer type of cupola is a tall cylinder of iron lined with fire-brick; the lowest third being the generator, over which is a solid arch, while the upper two-thirds constitute the superheater, or fixing chamber, which is packed with refractory checker-work. A bye-pass, provided with a valve, bridges over the arch, and establishes a connection between the top of the generator and the bottom of the superheater. Another pipe connection, likewise provided with a valve, leads from the top of the superheater to the ash-pit under the generator, and the gas outlet is from the bottom of the superheater. The operation of gas making with this apparatus is as follows: The generator is charged with fuel—oven coke being the kind preferred, when it can be had. This fuel bed is blown up to incandescence by an air-blast entering the closed ash-pit from beneath; the producer gas passing off through the bye-pass into the superheater, where it is burnt by the addition of a secondary air supply, and makes the checker-work very hot. The waste gases pass away through a valve on top of the superheater. When the apparatus is ready for gas making, the air-blasts are shut off, and the outlet-valves closed. Steam is turned on upon the top of the fuel-bed, and is drawn off down through the mass of coke; thus making water gas, which is conveyed (through the pipe connection already mentioned) to the top of the superheater, where it begins its downward travel in company with the enriching oil, which is admitted at this point. The superheater is hottest at the bottom, which is the last part touched by the carburetted gas; and this compound is, therefore, so fixed that it does not alter afterwards. Mr. Rew admits that the apparatus is good so far as it goes; but he declares that it cannot make gas to compete with coal as fuel.

Preference is apparently given by Mr. Rew to gas generators of the Siemens kind, without open top; for he remarks that the Lowe type of water-gas apparatus, in which the Springer is included, is defective on this account. Also, he finds fault with the Lowe generators for only using coke or hard coal. Mr. Rew consequently tried for some years to make illuminating water gas from bituminous fuel; and his narrative is very candid with regard to the difficulties he encountered in the attempt. He appears to have adopted the Siemens-Martin open-hearth steel furnace as his model, and to have set himself the puzzle of making illuminating water gas in a wholly closed circuit; saving everything that passed through the generator, for some special purpose. After many abortive attempts, Mr. Rew has caught at the idea of an inclined retort for carbonizing his bituminous

charge before gasifying its fixed carbon constituent. His very latest patent apparatus, therefore, comprises: (1) Inclined coking chambers, in which bituminous coal may be quickly coked by direct contact with fires; (2) generating chambers, for the manufacture of water gas, in which the coke produced in the coking chambers is immediately converted into gas, without drawing it out into a distinct chamber; (3) regenerators constructed and operated on the Siemens-Martin plan; (4) condensers and washers for all the gas; (5) separate holders for different kinds of gas produced by the apparatus; and (6) a method of so operating the plant as to permit the plastic coal to be stirred up, and the grate-bars cleaned, without stopping work.

Mr. Rew excuses himself for thus, as he says, discarding the Lowe system; and he claims that his object is not to do the same thing in a different way, but really and truly to improve upon the Lowe plant. He cannot get away from the Siemens plan, however, nor does he attempt to do so; contenting himself with the statement that the Siemens system is superior to the Lowe plan of open-top generators. He is good enough to admit that perhaps Mr. Siemens ought to have been the inventor of this new device, instead of himself; but he dismisses this part of the question with the observation that possibly Mr. Siemens is so busy with his steel-works, glass-works, &c., that he has had no time left to devote to making illuminating gas.

Finally, Mr. Rew thinks he has succeeded, by his new type of gas producer with the inclined carbonizing retort, in solving the great fuel-gas problem. He modestly says that it has been his aim "to design an apparatus for the complete conversion, in one operation, of either anthracite or bituminous coal, wood or coal dust, completely into the gas required; the methods being so economical and correct in scientific principles that they could not be surpassed and superseded, and the line of patents so complete, that competition and litigation with methods now in use, by a radical departure therefrom, could be avoided." Doubtless, Mr. Rew's inventive skill is as supreme as his mastery over the art of writing American with ease and elegance. After this, the only thing for other water-gas engineers to do is to retire from business, and leave the future of their trade to Mr. Rew and his licensees. Seriously, however, while there is something ludicrous about Mr. Rew's pretensions, his pamphlet contains a good deal of miscellaneous information about water-gas manufacture; and it is certainly worth looking through on this account.

Evening Star Lodge.—At the regular meeting of this Masonic Lodge last Wednesday, Bro. W. A. Valon, of Ramsgate, was elected W. M. for the ensuing year. Bro. Valon was J.W. of the Lodge; but the S.W. (Bro. David W. Sugg) consented to defer for a year his passing through the chair of the Lodge, so as to allow Bro. Valon to be W.M. during his year of office as President of the Incorporated Gas Institute—a compliment that all the members of the Institute who are Masons will highly esteem.

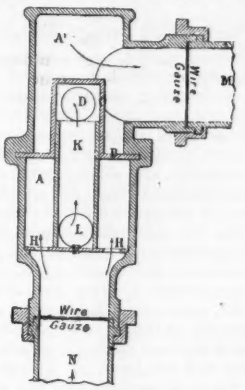
Southern District Association of Gas Engineers and Managers.—The next general meeting of this Association is to be held on the 12th inst., at the Holborn Restaurant, under the presidency of Mr. J. Methven, Assoc. M. Inst. C. E., of The Gaslight and Coke Company. We learn from the circular which has been issued to the members by the Honorary Secretary (Mr. J. W. Helps, of Croydon), that, in addition to the usual business of the November meeting—viz., the choosing of President and officers for the ensuing year, and the election of new members—there will be two papers, one by Mr. J. Tysoe, of East Greenwich, on "Carbonizing by Machinery;" and the other by Mr. R. Herring, of Dover, on "A Rapid Method of Increasing the Yield of Gas from Ordinary Settings." These papers are both on interesting topics; and they should draw a good attendance. After the proceedings, the members will take tea together.

Gas at the Brewers' Exhibition.—The thirteenth annual exhibition of machinery, appliances, and produce used in the brewing and associated trades, which was held in the Agricultural Hall, Islington, last week, calls for notice in these columns from the important part taken by gas in connection therewith, especially in its application to lighting purposes through the medium of regenerative burners and lamps. Some of the principal types of these appliances vied with each other in the production of a solid white flame with as low a consumption of gas as possible. A large number of the stands were lighted with these lamps in a generally satisfactory manner. Gas is a valuable auxiliary in a publican's business; and it behoves him to see how it can be employed under the best conditions. His inspection of the various high-power burners in operation at the Agricultural Hall must, if he reflected at all on the matter, have convinced him of their vast superiority, alike from an artistic and economical point of view, to many of the lighting appliances now in use in the trade. It must be acknowledged that regenerative lamps are rapidly getting a footing in hotels, restaurants, billiard-rooms, and similar places of public resort, where, as we have lately shown, they can be effectively combined with systems of ventilation. In addition to its use as an illuminant, gas gave evidence of its utility in other directions. There was a fairly good show of cooking and heating stoves and gas-engines (the latter rendering excellent service in the production of motive power for electric lighting and other purposes); and an attractive display of gas lamps and fittings.

NOTES.

An Anti-Fluctuator for Gas-Engines.

The unsteadiness of gas-lights placed in the neighbourhood of gas-engines has frequently been the cause of annoyance to consumers; and several appliances have been devised with the view of remedying the defect. To these the Paris Gas Company have lately added another, shown in the accompanying illustration, which is reproduced, with the following particulars, from a recent number of the *Journal des Usines à Gaz*. It is composed of a cylindrical chamber, partitioned off into two



divisions A A¹ by a plate B, carrying in its centre a small cylinder C, having in it two openings D. In the division A there is placed a light valve E, composed of a plate of aluminium, perforated with holes H, and carrying a small cylinder K, having an opening L. This cylinder slides easily in C. The division A¹ communicates by the pipe M with the gas-bag of the engine; the other division being connected by the pipe N with the meter. It will be seen that the gas arriving from the supply-pipe will pass through the openings H into A, then rise by way of L into the cylinders K and C, issuing at D into the division A¹, whence it proceeds straight to the gas-bag. Both on entering and leaving the appliance, the gas passes through wire gauze. As the suction of the engine produces a partial vacuum above the valve K E, which is in equilibrium, this will rise and close the openings D in proportion to the strength of the aspiration and the extent of the vacuum. In this way, as the effect of the vacuum is not felt to any great degree in the pipe M, the pressure will remain practically constant there, and the gas-lights in the vicinity will burn steadily.

The Effect of Variations of Temperature upon the Strength of Iron and Steel.

The available information respecting the effect of variations of temperature upon the strength of iron and steel has recently been summarized in *Industries*. It is stated that, according to both Sir W. Fairbairn and Professor Marten, variations of temperature between 0° and 395° Fahr. do not appear to produce any material alteration of the strength or elongation of iron or steel. The minimum elongation occurs at about 212° Fahr. The effects of low temperature on the mechanical properties of iron or steel appear to have received rather more attention than those of high temperatures. The most elaborate and careful experiments of the kind on record are those of Mr. Knut Styffe, Director of the Royal Technological Institute at Stockholm, carried out for the Swedish Government. Mr. Styffe concluded from these experiments that the absolute strength of iron and steel is not diminished by cold; but that at the lowest temperature which ever occurs in Sweden, it is at least as great as at the ordinary temperature of 60° Fahr. Also that, at temperatures between 212° and 392° Fahr., the absolute strength of steel is nearly the same as at the ordinary temperature; but that of soft iron is greater. Neither in steel nor iron is the extensibility less in severe cold than at the ordinary temperature; but it generally decreases considerably in the case of iron between 266° and 320° Fahr. The limit of elasticity in both steel and iron lies higher in severe cold; but at about 284° Fahr. it is lower, at least in iron, than at the ordinary temperature. The modulus of elasticity in both steel and iron is increased on reduction of temperature, and diminished on elevation of temperature; but these variations never exceed 0·05 per cent. for a change of temperature of 1·8° Fahr., and therefore can be left out of account for ordinary circumstances. Mr. C. P. Sandberg tested the accuracy of Mr. Styffe's conclusions with regard to the strength of iron rails and their resistance to sudden blows and shocks; and he claims to have discovered that iron becomes brittle under extreme cold. Mr. Webster, however, questioned Mr. Sandberg's results; and, by an independent series of experiments, ascertained the important fact that Mr. Styffe's report was correct, and that severe cold does not affect the tensile strength of the materials, but that it increases the ductility of each of them to about 1 per cent. in iron and 3 per cent. in steel. Mr. Webster also found that when bars of cast iron are submitted to a transverse strain at a low temperature, their strength is diminished

about 3 per cent., and their flexibility about 16 per cent. The experience of railway engineers in Russia, Canada, and other countries where the weather is severe, is that breakages of rails and tyres are far more numerous in the cold weather than in summer. The evidence extant in relation to this matter leaves no doubt that the capability of wrought iron or steel to resist impact is reduced by cold. On the other hand, what, for the sake of convenient distinction, may be termed its static strength is not impaired by low temperature; so that while it may be more dangerous to erect structural ironwork during periods of extreme cold, those erected are perfectly safe under the same conditions.

Carbonizing Sewage Sludge.

Mr. C. G. Moor contributed a paper to the Cardiff meeting of the British Association in which he passed in review the best existing methods of treating sewage, having regard to the character of the effluent and the value of the sludge, when any is produced. He concluded that no process yet adopted enables sewage to be got rid of in such a way as to create no nuisance, cause no danger to health, and do the work at reasonable cost. He proposed to treat sludge, obtained in any acceptable manner, by a novel method. If we could afford to distil the cake in gas-retorts, he observes, the ammonia would be saved; but this would not pay with ordinary sludge. Mr. Moor refers to an old patent of Mr. Rees Reece, for treating peat (in forced-draught cupolas of the gas generator type) for the recovery of tar, ammonia, acetic acid, and inflammable gas; and he proposes to treat sewage sludge cake in the same way. At Leyton, Mr. Moor built an experimental furnace of boiler plate, lined with brick, and fitted with a fan and condensers. It was kept burning with sludge cake alone for three weeks; and the experiment proved that this material—containing sometimes 30 per cent. of water—will give ample heat for its own distillation. The ammonia comes over with the liquor just as in gas-works, together with a quantity of light buttery tar, which floats on the liquor. If the blast is properly regulated, the uncondensed gases will burn, being similar to producer gas. The cake burns to ash or clinker; and it might be valuable for manure, if lime was not added in the process of precipitating the sewage.

COMMUNICATED ARTICLES.

LIGHTING.

By W. H. Y. Webber.

PART I.—THEORY.

(*Continued from p.* 754.)

This will be a convenient juncture to allude to contemporary French views of the general subject, for which purpose reference may be made in the first place to a memoir presented to the Société d'Encouragement, in February of the current year, by M. Auguste Lévy, Engineer of the Paris Gas Company, entitled "La Situation Actuelle du Gaz."* Dealing first with the field open to artificial lighting industries in Paris alone, M. Lévy quotes with approval an observation of M. Mascart to the effect that the demand for artificial light of some kind, which has increased threefold during the past 34 years, is likely to continue to increase until the total artificial lighting of the night equals daylight in intensity. After a calculation made by M. Hippolyte Fontaine, the mean daylight effect upon the 78 square kilometres of Paris, reduced to the population, amounts to 116 millions of candle-hours yearly, which is 10,000 times in excess of all the artificial lighting at present. From these figures, M. Lévy deduces the conclusion that the scope for the expansion of the lighting industries is unlimited. M. Lévy gives a mass of useful information respecting gas-burners and their applications which cannot be more than mentioned here. Upon the subject of lighting, he remarks that it is of the greatest importance to know the effect of various methods of illumination—that is to say, the quantity of light which is available for guidance, and enabling objects to be seen, when it is a question of public street lighting; the light afforded to objects for manual labour; the illumination of a sheet of paper for reading, &c. This effect depends upon the number, and the distribution of the luminous sources, and the amount of the reflection from walls, ceilings, &c.

Various photometers have been devised for the measurement of diffused light; but M. Lévy only describes that of Mascart. This apparatus, which is illustrated in the accompanying diagram, has been employed in many determinations of lighting in Paris.

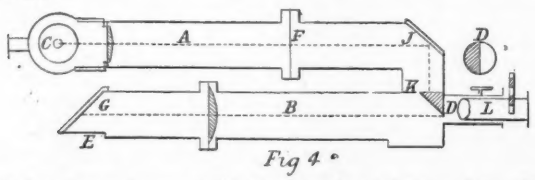


Fig 4.

It is composed essentially of two horizontal tubes A B. The tube A receives the light of a standard lamp C, carried at one end. The light of this lamp, reflected by the mirror J and the prism K, falls normally upon one-half of the screen D. The other half of the screen receives light through the tube B, at one end of which is the Foucault screen E, exposed to the lighting to be measured, and constructed of thick white paper. The light of the standard lamp passes through an identically similar piece of paper F. The screen E is so mounted as to be capable of revolving, so as to take any position in a circle normal to the axis of the tube B, and the light is always transmitted horizontally, owing to the effect of the mirror G placed at an angle of 45° behind the screen. The screen D is observed through a slide and eye-piece L. The apparatus is 0·85 metre in length, and is mounted on a moveable tripod.

Many interesting experiments have been made with photometers of this type; among the first being those conducted by M. Mascart, in 1888, by which he compared different systems of lighting—adopting as units the superficies and volume of lighted interiors. M. de Nerville, a telegraph engineer, has made a great number of photometrical determinations of the same kind at the Opéra, at the Hippodrome, at the Hôtel Continental, at the Central Telegraph Offices, and at the Central Markets in Paris. The following table gives a set of M. Mascart's determinations, which are of peculiar interest on account of the comparison they show between means of lighting in use at different periods:—

Names of Edifices and Places.	Dimensions.		Total Number of Candles or 0·1 Carcel.	Number of Candles.	
	Plan.	Content.		Per Sq. Metre.	Per Cub Metre.
Salle des Glaces, Palace of Versailles.					
In 1745	720	9,360	1,800	2·50	0·19
„ 1873	..	..	4,000	5·55	0·43
„ 1878	..	..	8,000	11·10	0·85
Salle des Fetes, Compiègne.					
In Fre8	440	3,520	1,000	2·28	0·28
Salle de Ville (Balls of 1888).					
Salle des fêtes	1295	24,000	18,720	14·46	0·78
Salle-à-manger	300	2,460	4,320	14·40	1·75
Salon de verdure	165	1,350	720	4·36	0·53
Grands salons	496	4,067	7,560	15·24	1·86
Galerie latérale	257	3,600	3,600	13·98	0·56
Salon réservé	165	1,350	720	4·36	0·53
Theatre (Auditorium).					
Odéon	350	5,600	2,470	7·06	0·44
Gaîté	250	4,800	2,360	9·44	0·55
Comédie-Française . . .	240	3,500	2,340	9·75	0·67
Palais-Royal	90	1,000	1,900	21·10	1·90
Porte St. Martin	200	3,250	3,200	16·00	0·98
Renaissance	96	1,400	1,970	20·52	1·40
Opera (Ball Nights).					
Foyer	672	7,392	6,000	8·93	0·81
Auditorium	400	9,200	11,140	27·85	1·21
Proscenium	530	8,000	4,720	8·90	0·59

The following relate to de Nerville's experiments, carried on in one of the rooms of the Central Telegraph Office, in the Rue de Grenelle:—

Superficies of the hall, 651 square metres; height, 7 metres; content, 4557 cubic metres.

1. *Electric Lamps* (15-carcel regulators of 8 ampères).—Maximum lighting underneath the centre lamp (horizontal) = 45 metre-candles; minimum lighting in the most obscure corner = 3·5 metre candles.
2. *Gas Lighting* (75 "Cromartie" lamps of 140 litres, or a total hourly consumption of 10 cubic metres of gas).—Maximum lighting underneath the central lamp (horizontal) = 23 metre-candles; minimum lighting in the most obscure corner = 3·5 metre-candles.

The maximum lighting in the first case is nearly double that in the second example; but the minimum is the same with both systems. Since lighting is not an absolute matter, but wholly relative, gas gives here less considerable differences from other than the local point of view. It is certain that if the consumption of the gas-lamps had been increased, so as to exceed the modest figure of 10 cubic metres per hour for a hall of this importance, there would have been added to the advantage of a better distribution of light that of a brilliancy comparable to that produced by electricity.

The following figures relate to the Central Markets: *Pavilion No.* 4.—Area, 2970 square metres; 12 Burdon arc lamps of 5 ampères at a height of 4 metres from the ground. Maximum lighting (vertical screen) = 7·5 metre-candles; minimum lighting (horizontal screen) = 0·065 metre-candle. The following are tests made in the show-room of the Paris Gas Company, in the Rue Condorcet: The room has an area of 70·50 square metres, and a content of 244 cubic metres. It has been lighted since September, 1888, by 17 recuperative lamps, with a total hourly gas consumption of 3·260 cubic metres. The luminous intensity, measured in the dark room, gave for the datum illuminating power of the lamps a little more than 80 carcels for a rate of consumption of 40 litres of gas per carcel-hour, or equivalent to 1·14 carcels per square metre, and 0·33 carcel per cubic metre. Tests with the Mascart photometer, made in

* This *brochure* was noticed in the JOURNAL last week (p. 752).

February, 1891, gave the following results: The photometer was placed in four stations; and in each of these, four positions were taken. Finally, in each position the screen was placed horizontally and vertically. The lighting effect was considerable; being comprised between the maximum of 100 metre-candles and the minimum of 27 metre-candles (screen horizontal), and between the maximum of 46 metre-candles and the minimum of 3·3 metre-candles (screen vertical). M. Lévy gives diagrams explanatory of these tests in every detail; but they are hardly of sufficient general interest to be reproduced here. They go to show with what extreme care the measurements were made; and they incidentally prove the reliability of the apparatus employed.

M. Lévy also gives the following data relative to electric and gas lighting, taken in the streets of Paris in 1889 and 1890:—

1. *Electric Arc Lamps.*—Rue Royale, 1·5 candles per square metre; Place de l'Opéra, 0·72 candle per square metre.
2. *Gas Lighting.*—Rue du Quatre Septembre, 0·45 candle per square metre; Place de la Bastille, 0·46 candle per square metre; Rue de la Paix, 1·5 candles per square metre.

M. Lévy remarks upon this that, from the point of view of the amount of lighting practically produced, exactly comparable results may be obtained from electric arc lamps or from gas in the public streets. Gas is preferable, however, on account of the easy subdivision of the light which it permits.

(*To be continued.*)

E PREVENTION OF STOPPAGES IN ASCENSION-PIPES.

By Norton H. Humphrys, Assoc. M. Inst. C. E., F. C. S.

The reading of the paper on "A Simple Method of Preventing Stoppages in Ascension-Pipes in Gas-Works" by Mr. L. H. Armour, at the recent meeting of the North of England Association of Gas Managers (*ante*, p. 620) led me to look back at the numerous previous papers and discussions that have been reported in reference to this subject, at meetings of the British Association of Gas Managers and at district gatherings of gas engineers. It is interesting to notice the cool and nonchalant way in which this subject is now treated, as compared with that of twenty years ago; showing that it occupies a very different place in the estimation of gas engineers at the present time, to that held by it in 1871. At that period everyone appears to have been more or less troubled in this respect. Some went so far as to declare that it was the greatest nuisance about a gas-works. The prospect of spending 15s. or 20s. per mouthpiece for apparatus that would mitigate if not cure the evil, was cheerfully entertained. Now we are occasionally told by a gas manager that "he does not know what a stopped ascension-pipe is;" while others, who perhaps may represent the ordinary run of rank-and-file, occasionally have to remove a retort-lid to clear out an obstruction in the ascension-pipe, or once in a way have to miss a charge in order to burn out a deposit. This is done by the retort-house men without interfering with their regular work, and does not cause special annoyance or complaint. So that when the suggestion is put forward to spend 5s. or 10s. per mouthpiece on an appliance that is to render stopped pipes a thing of the past, many raise the question of whether "the game is worth the candle;" and if there is a small aperture to keep clear, or anything else that calls for continual watching or attention, there are sure to be several who prefer to rather bear their present sufferings, than "fly to others that they know not of."

What has caused this change? As compared with twenty years ago, larger and longer ascension and bridge pipes are now the general rule. Not only are 4-inch pipes replaced by 5-inch or even 6-inch, but the settings are carried up higher; and the hydraulic main is raised to a greater distance above the top of the setting, so that the length of pipe in which a fall back to the retort takes place is now several feet longer than it used to be. The hydraulic main and dip-pipes are now very accurately constructed, so as to work with the smallest possible seal; and care is taken that this seal shall consist of water only, and that tar shall be absent from it. A direct cut from the hydraulic main takes the gas into a large foul main; and, altogether, the way through to the exhauster is now much more roomy than hitherto. The gas that is being made has a far better time of it, between the retort and the exhauster, than its predecessor of 1870. If it were possible to compare a list of pressures taken at the mouthpieces in the year 1871 with a similar list prepared in 1891, the differences would go a great way towards explaining the diminution of stoppages in the ascension-pipes. And this in spite of the fact that, with the introduction of generator furnaces, the working temperatures have been raised; thus apparently increasing the liability to this inconvenience, for high heats and stopped pipes have always been associated together.

Among the various remedies suggested, the chief idea has been to keep the mouthpiece and ascension-pipe cool. A great many different plans for effecting this have been proposed from time to time. Great stress has been laid upon the necessity for having pipes of ample size, and not too near to the retort-stack. Some, like Mr. Barnfield,* have advocated the admission of cold air circulating round the pipes and mouthpieces. Many devices for applying water, either internally or externally, have been suggested, of which that described by Mr. Crowe* may be cited as an example. Most of these have consisted in the supply of water at the top of the pipe, rather than to the mouthpiece; and I cannot but regard Mr. Armour's proposal to supply water or liquor to the latter, as a step in the wrong direction. It is to my mind simply an advance on the old pannikin of water or the shovelful of wet coal, the objection to which was that while they effected their object, they also reduced the temperature at the front of the retort. At the best of times, it is difficult to maintain a good working heat within (say) 2 feet of the mouthpiece; and a very small cause is sufficient to check the temperature—undoubtedly keeping the ascension-pipe clear, but doing so by the production of larger quantities of tar, with a corresponding diminution in the yield of gas. If we seek to avoid the waste of coal at this part of the retort by keeping the charge farther back, so as to leave a clear space of (say) a foot between the mouthpiece and the front of the charge, there is a loss of retort capacity, as lighter charges must be used. This objection applies to all methods of cooling the ascension-pipes, and more especially to those where the cooling influence is applied at the mouthpiece.

Some have sought to dissolve the pitchy matters that gradually accumulate at the lower part of the interior of the ascension-pipe, by the use of materials that give off tars of a sufficiently fluid nature, but still possess such a high boiling-point as will secure their deposition in the ascension-pipe. Perhaps the most primitive method of doing this is the lump of coal in the mouthpiece; and any plan that tends to cool the mouthpiece will also tend to the formation of a larger quantity and lighter quality of tar. A handful of dirty (oily) waste has been suggested; and the use of animal fat has been covered by a patent. In France, an article has been largely advertised and sold for this purpose under the name of "*anti-brai;*" and lately an English firm of coal merchants have made a speciality of a material that combines the advantages of an enricher with that of a preventive of choked ascension-pipes. Any plan of dissolving the deposits without interfering with working conditions is preferable to the application of cooling agents to the mouthpiece.

While the effect of the heat radiated from the front of the setting on to the mouthpieces and ascension-pipes has been fully discussed, there is one point which I do not think has been sufficiently appreciated, and that is the effect of the heat radiated from the interior of the retort itself into the interior of the mouthpiece. If we take the fire-clay block out of a furnace door, it is not long before a red heat shows through the iron.

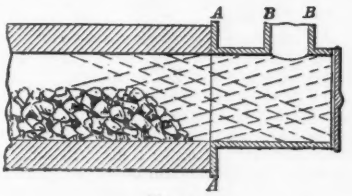


FIG. 1.

But if we examine the section of a retort and mouthpiece as shown in fig. 1, it will be evident that the whole surface of the interior is subject to radiant heat from the incandescent surface of the retort and the charge, as shown by the dotted lines. The area thus exposed is considerable; representing 5, 6, or even more square feet of iron, according to the size of the mouthpice. If an ascension-pipe, placed within 2 or 3 inches of the brickwork at the front of the setting, absorbs an objectionable degree of heat, what is to be expected of this area of iron exposed to a red heat? No doubt a large quantity of heat is absorbed, and conducted with comparative rapidity to the ascension-pipe at B. Mr. West records that in some of his experiments he used large mouthpieces; and the result was a great loss of heat, which showed itself in the fuel account.

Having noticed this point, I will proceed to discuss another class of appliances that have been brought forward with the view of preventing stoppages in ascension-pipes. These consist of an obstruction introduced at or about the part A where the ascension-pipe joins the mouthpiece. Green's apparatus, described at the meeting of the British Association of Gas Managers in 1873, and Vincent's, which was brought before the same Association the following year, may be instanced as examples.† The former consisted of one or two plates, placed in a slanting position at A. They were cut to fit the mouthpiece, with the exception of an aperture, somewhat larger than the ascension pipe in area, left for the passage of the gas. If one plate was used, this was placed at the bottom, so that the gas had to pass underneath the bottom edge; if two plates were employed, the gas passed out at the top part of the inside one, downwards between the two, and through the outer one at the bottom. Vincent's arrangement was a sort of cast-iron grating made to fit the mouthpiece. It was similar in design to the ordinary wood grids for purifiers, having longitudinal gridiron-like slits. No

* See JOURNAL, Vol. XLIX., p. 595.

* See JOURNAL, Vol. XLIII., p. 488.

† These appliances were described in the JOURNAL, Vol. XXII., p. 593, and Vol. XXIV., p. 54.

doubt anything in the way of an obstruction introduced at A would be thickly coated with pitchy matter and soot; but few would care to go so far as to say that the deposit represented matters that would otherwise have accumulated in the ascension-pipe. The current of gas, at the most active time, is scarcely sufficiently rapid to carry fine particles with it, like dust before the wind, even if any coal dust introduced into the retort remained dry and light, which is very doubtful, seeing that it would probably be agglutinized by decomposition. But the inventors of these appliances seem to attach a great deal of importance to the filtering action.

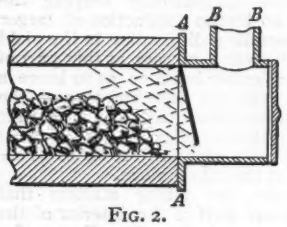


FIG. 2.

FIG. 3.

On turning to fig. 2, it will be seen that the effect of introducing a plate at A is to intercept the radiant heat. The mouthpiece should, therefore, be cooler when the plate is used. The grating would exercise a similar effect, though perhaps not to so complete an extent. We thus obtain the advantage of lowering the temperature of the mouthpiece, without the attendant objection of reducing that on the other side of A. And probably this is the true explanation of the advantages obtained by its use. I have not had any personal experience with appliances of this kind; but if the above reasoning is correct, the plate at A should not only produce a cooler mouthpiece, but also secure the complete carbonization of the front part of the charge. The former would not only mean less liability to choked pipes, but also a cooler atmosphere in the retort-house.

Another method of preventing the radiation of heat to the interior of the mouthpiece would be to provide the lid with a thin lining of fire-clay or other suitable non-conducting material and to make the mouthpiece rather larger than the usual size, so as to admit of its being lined with blocks of similiar material, as shown at A in fig. 3. This is simply an application of the usual custom of fixing a fire-clay slab in the furnace door. It might be extended to the lower half of the ascension-pipe, with the view of preventing the absorption of radiated heat from the front of the setting. The pipe could be made of either steel or wrought iron, and surrounded with a casing of fire-clay or boiler composition. This plan seems so simple, that I am surprised not to be able to find any record of its having been tried.

Besides the methods of cooling the pipes by the external application of water, it has been proposed to surround the pipe by a casing of sheet iron, leaving an air space between to act as a non-conductor. According to the results of Mr. D. Kinnear Clark's experiments upon gas cooking-stoves in connection with the Crystal Palace Electric and Gas Exhibition of 1882-3, this should be quite as effective as any solid non-conductor. A water-jacket has also been adopted; and I have found it a most useful auxiliary in the destructive distillation of heavy tar oils, and other substances which are likely to cause trouble from the deposition of pitch. It is also employed in connection with the Dinsmore process at Widnes; and it will be remembered that the gas escaping from the "duct" which forms the characteristic feature of this process, is in several respects subjected to the influences that are found in ordinary working to be conducive to chokes.

Another point that does not appear to have been appreciated in discussions on this subject, is the effect of the "length" of the ascension-pipe. It is known that the upper retorts suffer most from chokes; and this is usually accounted for by the fact that the retorts are hotter, and the charges therefore worked off more quickly. But it may be worth while to consider whether the fact that the ascension-pipe from a top retort is some 4 feet shorter than that from a bottom one is not, to some extent, concerned in the matter. Condensation is very active in the upper part of the ascension-pipe; and it is possible that fluids precipitated at that part may trickle down the interior of the pipe—dissolving and carrying down viscid pitchy matter which would otherwise accumulate. These matters, being again revolatilized in the mouthpiece, would absorb heat, and thus tend in a small degree to cool that part of the apparatus.

In the course of the discussion on Mr. Armour's paper, the question was raised as to whether the use of ammoniacal liquor was preferable to that of pure water. As an incidental matter, it may be better to use the hydraulic main water than to charge the gas with an additional quantity of steam with the object of obtaining the desired strength of liquor in the store-well. But that the vapour from weak ammoniacal liquor is more active than pure steam, as a dissolver or dispeller of pitchy matters, I cannot believe. The gas is already charged with impurities similar to those given off by the liquor—such as ammonia, sulphuretted hydrogen, &c.; and it is not likely that a small addition to these would affect the question one way or the other. Ordinary gas-works liquor contains but an infinitesimal quantity of light hydrocarbons—not enough, in fact, to exercise any solvent action. The liquid is applied simply as a cooling agent; and therefore it is immaterial whether the water is pure or charged with a moderate proportion of impurity already absorbed from the gas. But in this connection I would suggest, to those who are using Mr. Armour's system, that light tar, such as that collected from near the outlet end of the condenser, might be tried in place of the water. It is possible that the vapours given off in that case would not merely act in a neutral manner, like steam, but also as a solvent upon any viscid matters accumulated in the ascension-pipes. An important point was referred to in the discussion, when Mr. Hall mentioned the fact that town water sometimes contains lime, whereas liquor does not. This is really a question of hard *versus* soft water. Wherever ordinary spring water is allowed to become warm, a calcareous deposit is apt to occur. If hard water was supplied to a device such as that now under consideration, the result would be frequent stoppages at the jet. Such trouble has repeatedly arisen with apparatus of this class; and it is usually ascribed to the dust, &c., always about gas-works. So that ammoniacal liquor certainly affords all the advantages that would be secured by using rain or condensed water.

Presentation to Mr. John Hallam.—Last Wednesday evening, Mr. John Hallam, of Nottingham, was presented, by a number of friends and employees of the Corporation Water Department, with a costly pair of bronzes, a marble timepiece, and an illuminated address, upon his retirement, after fifty years' active service in connection with the water-works.

Gas from Lignite.—According to the correspondent of *Industries* at Rome, some tests have lately been made at Spezia with Sapori's process for making gas by the dry distillation of lignite, which have shown that this material cannot compete with coal in regard to cost, as had previously been claimed. The tests were carried out in the presence of a number of gentlemen interested in the manufacture of gas. The average return of gas from lignite was from 20 to 22 per cent.; that of coke, from 50 to 55 per cent. As coal yields 30 per cent. of gas and 75 per cent. of coke, it will certainly be preferable to use this material for gas-making purposes. At its present price, 1 ton of coal produces 10,600 cubic feet of gas, fetching in the locality 5s. 8½d. per 1000 feet, or £3; 15 cwt. of coke, at about 1s. 8d. per cwt., £1 4s.; and 1 cwt. of tar, 1s. 5d.—total £4 5s. 8d. On the other hand, 1 ton of lignite at its present price will yield only 7000 cubic feet of gas at the above-named price, £2; 10 cwt. of coke, worth about 5d. per cwt. (say), 4s.; and 4½ lbs. of tar, worth about 4d.—total, £2 4s. 1d. The cost of manufacture is the same in each case.

The Conveyance of Petroleum.—Mr. Mansel Jones and Colonel Majendie, who a short time ago investigated the nature and causes of the fatal accident on the steamship *Tankarville* in the Newport Docks on the 11th of May last, whereby, as mentioned in the JOURNAL at the time, five men lost their lives, have reported that the catastrophe was due to the ignition and explosion of a quantity of petroleum vapour in admixture with atmospheric air accumulated in and about the ballast-tank; but it was impossible to state to what cause the ignition was due. They add that in many respects the constructive details of the vessel were defective; that the ballast-tank was not a suitable place for the conveyance of oil; and that no steps had been taken to cleanse and ventilate the water-ballast tank and adjoining spaces. In their opinion, an amendment of the law is urgently called for to enable proper regulations, general and local, to be made for the conveyance of petroleum, whether mineral oil or mineral spirit, and whether in barrel or in bulk. Power should, they think, be reserved to a central authority (such as the Board of Trade) to make general regulations dealing with what may be distinguished as common risks and general precautions. The methods of cleansing and ventilating petroleum vessels should also be investigated.

The Chicago Exhibition of 1893.—The Council of the Society of Arts, acting in their capacity of English Commissioners for the Universal Exhibition which is to be held in Chicago from May 1 to Oct. 30, 1893, have issued a prospectus announcing that they are prepared to receive, at the Society's offices in the Adelphi, applications from persons who may be desirous of taking part in the exhibition, and to afford them all necessary information in regard thereto. The exhibition will be situated in Jackson Park; and the principal buildings will be devoted to the following main divisions: (1) Fine Arts; (2) Manufacturers and Liberal Arts; (3) Agriculture; (4) Machinery; (5) Electricity; (6) Mines; (7) Transportation; (8) Horticulture. The exhibits will be classified into twelve departments. In department H (Manufacturers), groups 113 and 114 will comprise lighting, cooking, and heating apparatus and appliances. Department J will be given up to electricity. In Department L, group 147, will consist of instruments of precision, experiment, and research; and group 148, civil engineering, public works, and architecture. In Department M (Progress of labour and invention), group 158 will consist of tools and implements of industrial operations. The Secretary of the Commission is Sir Henry Trueman Wood, M.A.; his assistants being Mr. H. B. Wheatley, F.S.A., and Mr. E. H. Lloyd.

REGISTER OF PATENTS.

Gas Motor Engine.—Lentz, H., Czermak, F., Streitmann, L., and Bergl, A.; all of Vienna. No. 21,165; Dec. 29, 1890. [8d.]

This invention relates to a construction of single-acting gas motor engine, in which each outstroke is a working stroke; the engine requiring no cooling with water.

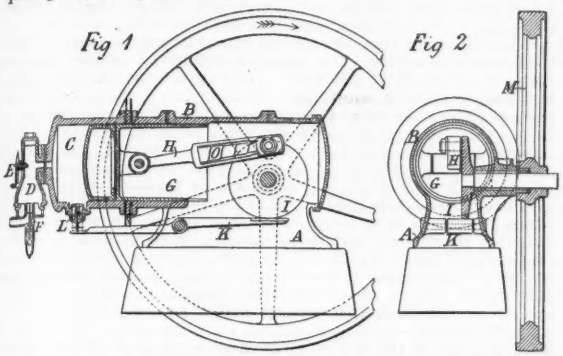


Fig. 1 is a longitudinal section, and fig. 2 a cross section of the engine.

The engine casing A, mounted upon a suitable base, has formed in one with it a bearing for the fly-wheel shaft and a cylinder B, which is open at both ends, but closed at the outer end by a cover as shown. The cylinder is so arranged as to be as much as possible in contact with the outer air, in order to effect a rapid distribution by radiation of the heat which it may take up. With the cylinder B is combined the working cylinder C, the length of which is equal to the stroke of the piston, and the inner diameter of which is slightly less than that of the guide cylinder. At the point of connection of the two cylinders is introduced a ring composed of alternate layers of good and bad conductors of heat, by means of which the transmission of heat from the cylinder C to the cylinder B is as much as possible prevented. With the working cylinder is connected, by means of a passage, a separate explosion chamber D, into which the combustible gases, together with the necessary quantity of air, are admitted through a valve apparatus F, and where the mixture is fired by an igniting device E. This may consist of a gas-flame (Bunsen burner), as shown on the drawing, which passes into the chamber D through an igniting passage, or of a device for igniting by electricity or by percussion.

The piston G, which is made hollow for more readily keeping it cool, works partly in the cylinder C and partly in B. It has a separate head connected to it, with an intervening layer of a bad conductor of heat, so as to prevent as much as possible the transmission of heat from the cylinder to the piston. To the piston is pivotted a connecting-rod H, in the looped end of which is situated a volute spring O, in order to convert the blow produced by each explosion into a more or less uniform elastic pressure transmitted to the fly-wheel shaft. For this purpose the crank-pin on the eccentric or cam disc I of the shaft is carried on a block, which can slide in the loop of a rod H, and which is pressed outwards by the spring. The disc effects the opening of the discharge-valve L at the required moment by means of the lever K.

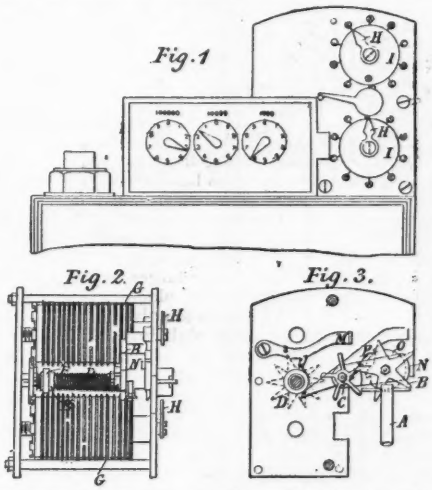
For starting the engine, the igniting device E and the valve apparatus F are connected to a gas-supply pipe. The gas-jet issuing at E is ignited; and the gas supply to F having been opened, the fly-wheel is turned by hand in the direction of the arrow, until the first explosion takes place. On the rotation of the fly-wheel, the piston is moved outwards; thus, in the first instance, forming a vacuum in the cylinder C as the valve is held close by a spring, until the suction is sufficient to cause the valve to open against the spring. A supply of gas and air then enters the explosion chamber D, whereupon the valve will be again closed by the spring, as the outer pressure upon the valve is reduced again. In consequence of the suction produced in the chamber D, the flame at E will be drawn into it, and will thereby effect the ignition of the charge, producing a sudden blow on the piston, which is thereby driven outwards. This blow is, in the first place, taken up by the spring, and is transmitted thereby, in a more or less uniformly distributed manner, to the crank disc I and the fly-wheel shaft, causing the rotation of these parts. When the piston arrives at the end of its stroke, the eccentric or cam I, in pressing the lever K downwards, causes the other end of it to open the discharge-valve L, so that, on the return stroke of the piston, the combustion gases are expelled. At each revolution of the fly-wheel shaft, the operation is repeated.

Stopping Meters when a Predetermined Quantity of Gas has Passed.—Green, H., of Preston. No. 8288; May 14, 1891. [8d.]

This invention relates to apparatus applicable to gas and other meters for arresting them when a determined quantity of gas or other fluid has passed—namely, a combination of sets of stops, made adjustable in accordance with a pre-arranged key or table; a moveable part adapted to travel in a path where, in certain positions of the stops, it will be arrested; and means for imparting movement to the parts from the meter while it is working. The arrangement is such that the arrestment of the moveable part by the stops will cause a stoppage of the meter, which will not again work until adjusted in accordance with the key or table applicable to the stop that caused the stoppage.

Fig. 1 is a front elevation showing the apparatus constructed according to this invention (fitted upon a gas-meter, part of which only is shown). Fig. 2 is a side elevation without the case. Fig. 3 a vertical section, showing the arrangement of the parts; the sets of stops being removed, and the position of one star-wheel being indicated by dotted lines.

A is the upright spindle of a wet gas-meter. B is a star-wheel driven intermittently by the projecting ends of A. The pin on this star-wheel, on each rotation of that wheel, acts upon, and partially rotates, the second star-wheel C. The pin on the wheel C is adapted to act in each rotation upon, and impart intermittent motion in a rotary sense to, a star-wheel fast on the tubular screw D. E is a nut on the screw D. F is a piece surrounding the nut, and somewhat loosely pivoted thereto by pivot pins. There are upper and lower projections on the piece F; and pins project from F, one on each side of a tie-rod of the instrument, to prevent rotation of the nut about its axis, and thus cause them to travel on the screw. G are sets of annular stops parallel to the axis of the screw, and formed with brakes or gaps (one in each stop) to allow the projections to pass. These projections, being on the pivoted piece F, can readily adjust themselves to bear evenly on an upper and a lower stop at the same time. H are fingers or pointers, one on the pivot of each set of stops; and I are indexes by which the stops G can be adjusted—in accordance with a key or table—to bring a gap opposite each of the projections, so as to permit the nut E to travel on the screw D, and thereby to allow of the supply by the meter of the desired quantity of gas. These adjustments can be effected until the whole of the stops are passed. There is a non-rotating rod passing through the tubular shaft D provided at one end with a piece carrying projections, and having at the other end a screw thread, on which works a nut that can be turned in either direction by an arm attached to it, so as to move the rod endwise, thereby throwing the projections into or out of engagement (as the case may be) with the lateral projections at the end of each set of stops G. At the same time a shoulder on the locking-rod causes the tubular screw D to travel slightly endwise with the rod sufficiently to move, when unlocking the stops, the projections of the stop-nut clear of the annular stops that have last arrested it; the projections being brought back to their first position by the action of locking the stops.



This apparatus affords great security against fraud, as the removal of the projections from the stops G, caused by this slight endwise movement of the screw D, has the effect of preventing the proper positions of the stops being found by mere touch; and renders it essential to possess the proper key or table in accordance with which the stops G must necessarily be adjusted before the projections will be able to pass.

M is a loosely pivoted locking lever, which tends to fall and so bring its lateral projection, adapted to serve as a stop, between the teeth of the star-wheel C, or behind the lateral pin of the wheel (a pin on the lever entering at the same time between the teeth of the star-wheel), but is moved clear of the wheel, in the act of locking the annular stops, by a cam, formed with, or attached to, the nut that works the locking-rod before mentioned. N is a loaded or heavy rocking-arm, the movement of which is limited by a pin projecting into a slot in the rear of it. The star-wheel B is mounted upon this lever; and a disc O provided with ratchet teeth is carried on the spindle of this wheel. P is a stop lever mounted on the spindle of the star-wheel C.

When the nut E is arrested by the annular stops G, the star-wheel B tends to rise upon the next wheel C; thus bringing a ratchet tooth of the disc O into contact with the tooth of the stop lever P, and so arresting the meter without undue strain upon the screw D and other parts. The meter is set free, in the act of unlocking the annular stops, by the cam of the locking-nut, which is arranged to act upon and depress a tail of the lever P, thereby raising the teeth out of engagement with each other.

Where it is desired to provide in connection with apparatus such as above described means for giving an indication before the quantity of gas or other fluid for which the apparatus is set has been entirely consumed, an electric bell or alarm is, according to one arrangement, used in combination with a circuit closer adapted to be operated from a moving part of the meter, which is arranged to bring the circuit closer into action at the proper time, and thereby complete the circuit in and operate the electric bell or alarm.

After the apparatus has been fixed to the meter, the operator can only obtain access to the index and pointers or fingers, inasmuch as the rest of the apparatus is enclosed by a cover; so that the operator cannot ascertain by inspection of the internal machinery how to set the index.

When the nut E has passed the whole set of stops, the apparatus is removed and replaced by another adjustable in accordance with a different key or table; or the stops are removed, and other stops inserted in their place. If the stops only are removed and replaced, the nut must be put back to its starting position ready to again travel forward between the stops. The apparatus or stops so removed may be transferred and fitted to other meters prepared to receive them.

The Manufacture of Illuminating Gas.—Allen, J. F., of New York. No. 9716; June 9, 1891. [8d.]

This invention relates to the manufacture of illuminating gas by the destructive distillation of coal, oil, or other heavy hydrocarbons; and its object is to secure an increased quantity of ethylene gas, or the homologues thereof, and "lean" gas (such as light carburetted hydrogen) in great quantities.

This is accomplished "by the continuous circulation, through carbonaceous material, of the crude gas distilled therefrom; the product, in the process of circulation, being highly heated in a regenerative fire, and the circulation continued until the watery and tarry vapours in the crude gas are decomposed, and thereby converted into a permanent gas; and the carbonic acid produced in distillation is converted into carbonic oxide—a combustible gas; and further the necessary heat is conveyed from the fires to carry on the distillation." This is accomplished by the products of destructive distillation being brought into continual contact with fires and heated surfaces of incandescent carbon; one of the chamber fires being heated while the other (by passing off the gas through it) is being lowered in temperature. Thus, by changing the circulation from time to time from one fire chamber to the other, the increased heat of the crude gas is continually maintained during the process of distillation. The patentee thus claims to be enabled to de-carbonize the heavy hydrocarbon vapours from the tars from coal or oil, by oxidizing a portion of their carbon by means of the oxide of hydrogen natural to them or added thereto, and by this means to produce a portion of hydrogen to hydrogenize the heavy hydrocarbon vapours, which is equivalent to decarbonizing them, thereby producing ethylene or its homologues, which only differ in structure or density, all of them possessing the chemical equivalents, C, N, and H_2N.

Fig. 1.

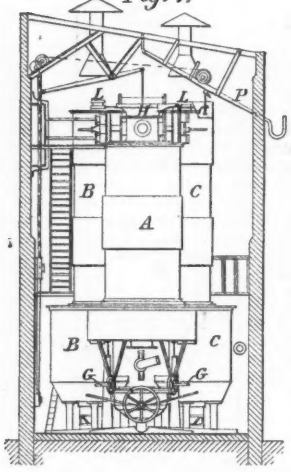
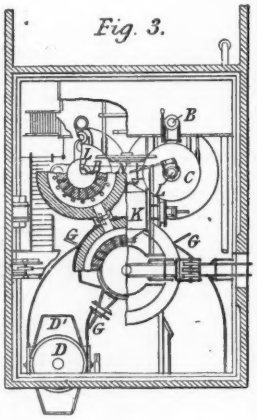


Fig. 3.



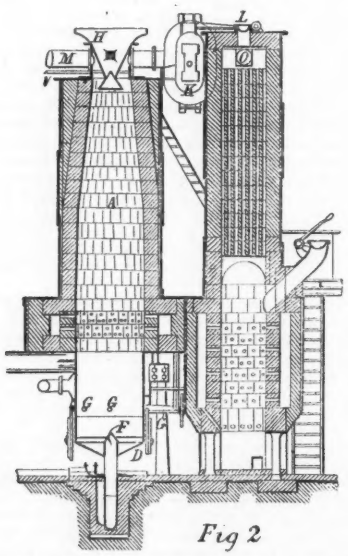


Fig 2

Fig. 1 is an elevation (in perspective) of the apparatus, showing the distillation chamber and the two regeneration chambers connected therewith. Fig. 2 is a transverse vertical section through fig. 3, which is a plan view in section at different heights.

A is the distillation chamber or cupola supported on pillars, and provided with a tunnel head H, through which the coal is fed to the cupola and tuyers, through which the heated gases are passed from out of the regeneration chambers B C. The belt of tuyers is surrounded by an annular space, connected by valved passages with the annular spaces around the regenerating furnace. The tunnel-head is opened and closed by a bell-valve; and when the coal is fed to the cupola, its proper distribution therein is secured by the deflecting surface of the valve. M is the discharge-pipe, which carries the excess of permanent gas to the hydraulic main and purifiers; the pipe being always open, but under a seal of water in equilibrium with the atmosphere, as is practised in the ordinary way of making gas. That portion of the chamber below the enlarged part A (which surrounds the annular space and tuyers leading therefrom) is preferably suspended from the cupola, as shown in fig. 2; and it is surrounded by a shell, so as to form an annular air space ar. ind the base of the cupola. Cold air is admitted through an openin into this annular space, cooling the coke in the chamber, and utilizii. the heat thereof on its way to the furnaces of the regenerating fire cha:: bers B C.

D is a tub or barrow, which seals (when in positio. an opening at the base of the cupola. The barrow is intended to convey away, by means of the track E, the coke formed in the cupola. It is placed and held in position by the ram F, fitting in a recess beneath the barrow. The water which exerts the required hydraulic pressure to elevate the barrow, is admitted through a valve from a tank placed at a proper height to develop enough force; and the ram is lifted so as to carry the empty barrow into the position shown in figs. 1 and 2. The other valve is then closed, and an increased pressure is put upon the ram, sufficient to carry the load, and thus seal the base of the cupola. When the barrow is to be removed, the valves are changed; and the weight of the coke and the barrow causes a back action on the column of water, and forces it back into the tank. In order to break out from the base of the cupola a barrow-load of coke, and at the same time support the column of carbonaceous material above it, the radial spurs G are provided. They act as wedges to the tenaceous body of coke, which they enter, and break off the coke just above the line of the upper edge of the barrow. The spurs are inserted and withdrawn by means of wheels having a threaded opening at the centre, engaging with threaded portions of the spurs—the wheel acting as a set-screw upon the spurs.

The regenerating chambers B C are provided with furnaces, as in fig. 2, surrounded by an annular space, from which leads the belt of tuyers through which the air, as admitted, is fed to the fire within the furnace. This belt of tuyers extends from the bottom of the furnace to nearly the height of the bed of fuel within it; the purpose of this construction being to promote, through an equal distribution of the air, when forced into the body of the fuel, a more perfect and more rapid combustion than would otherwise be obtained in so deep a fire. By this means the formation of carbonic oxide is prevented when the fires are being regenerated, which if allowed to be formed would rob the furnace of heat in volatilizing the extra carbon. Consequently, economy is secured in the utilization of the heat elements upon the fuel; and when the currents of hot gases are blown upwards through the fire-brick construction above the furnace, the proper temperature is secured.

The furnace is fed through an opening fitted with a moveable cap operated by a lever. The two regenerated fires are connected with the distillation chambers by a T-shaped pipe O, attached to a blower K. Each arm of the T is provided with a valve, so that the line of circulation, continually maintained in the distillation chamber, may be caused to alternate at will from one of the regenerating chambers to the other. Similar valves are provided to connect the annular spaces shown; so that a complete circuit in the movement of the heated gases can be secured during the process of destructive distillation. P is the elevated track along which the bucket containing material for the distillation chamber is carried by means of a wheel-pulley and lifting rope. The curved lower end of the track arrests the inclined movements of the wheel-pulley, and thus permits the empty bucket when it reaches this point to descend for a new load.

The manner of operation is as follows: The bottom of the distillation chamber A is closed by the barrow D, the top edge of which impinges against a ring of asbestos placed in a recess at the lowest portion of the chamber, the base of which is filled with large coke to a line just above the belt of tuyers. On this coke, which fills the cupola nearly to the base of the tunnel head, is placed the coal which is to be distilled. The inlet-valve is then closed; and one of the regenerating fire chambers—for example chamber B—being filled with anthracite coal or other carbonaceous fuel, is then fired; the belt of tuyers surrounding it admitting the forced draft of air to the body of the fuel in the furnace. The cap of the furnace is removed when the fire is started; and the valve in the upper passage O, leading to the distillation chamber through the blower K and passage N, and the valve on the lower passage connecting the annular spaces, are closed, while this blowing up or heating of the fire-brick flues is continued. When the fire and fire-brick above it have reached the proper temperature, the cap is placed in position; the valves in the upper and lower passages opened; the blower K started; and the contained atmosphere of the distillation chamber is forced down through the flues and through the furnace fire of the regenerating chamber, passing through the tuyers and thence into the coal or other carbonaceous material within the distillation chamber. Passing up through the coal, the crude gas is again forced down through the regenerating chamber and fire as above; and the circulation is continued until a portion of the heat taken up by the crude gas in the regenerating chamber is transferred to the distillation chamber. The watery and tarry vapours in the crude gas, in their passage through the regenerated chamber and fire (by exposure to the carbon at the high temperature therein) are decomposed and converted into permanent gas. While this rapid circulation of the products of destructive distillation is going on, the other regenerating chamber C is being regenerated or fired to the proper degree of heat; and when this has been obtained, the line of circulation is changed by opening the valves in the upper and lower passages which connect with the distillation chamber, and the valves leading to the chamber B are closed—the temperature in this chamber having been reduced by the continuous contact of the dense hydrocarbon vapours with its fire and heated surfaces.

Thus the process is continued—alternating from one regenerating chamber to another; the excess of gas produced passing off through the discharge-pipe M. As the coal within the distillation chamber is coked, a new supply is fed through the tunnel-head; the coke at the base of the cupola being removed in the barrow D, as described.

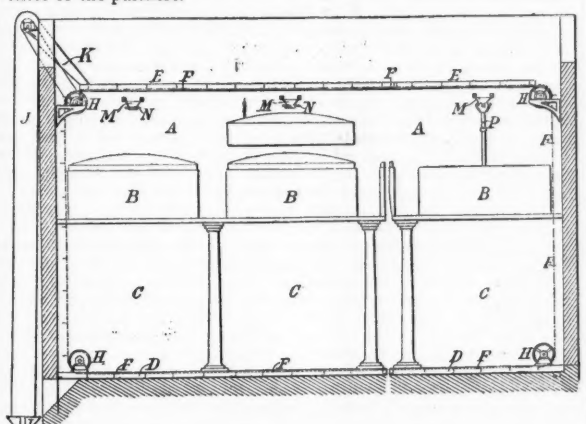
In making oil and water gas by this process, all that is necessary to do is to fill the distillation chamber with coke instead of coal; and

oil (preferably in the form of spray) is admitted through the pipe V, above the line of the coke in the distillation chamber. Steam injected into the regenerating chamber becomes superheated and decomposed as it is forced by the action of the blower down through the highly heated flues and furnace fire; and, mingling with the hydrocarbon vapours of the oil, it passes through the tuyers up through the body of coke, communicating portions of its heat thereto. The circulation of the highly heated vapours thus goes on continuously, the same as if the destructive distillation of coal was being carried on.

Transporting and Delivering Purifying Material used in the Manufacture of Gas.—Stevenson, J., of Metal Exchange Buildings, London. No. 12,256; July 18, 1891. [1s. 1d.]

This invention comprises an arrangement of chain conveyor, and apparatus in combination therewith, whereby the purifying or other material may be conveniently and economically handled. As applied to the handling of oxide of iron, for example, the invention provides for the raising of the oxide from the revivifying floor and delivering it again to the purifiers by mechanical means, so as to largely dispense with hand labour. The needful apparatus comprises (in combination) a conveyor, an elevator, and a distributor.

It is proposed to sink a trough in the floor of the revivifying-house, and arrange a conveyor preferably of the chain type, with suitable push-plates to work in the trough. Into this trough the oxide when sufficiently revivified is thrown; and it is conveyed by the push-plates along the trough and discharged into a hopper arranged at the end of it. From this hopper the oxide is withdrawn by an elevator of the chain or other ordinary type, and is delivered thereby into a second trough (situated above the purifiers) in which the return portion of the chain conveyor travels, being led from the lower to the higher trough by guide-pulleys. The oxide is then conveyed along the upper trough by the return portion of the conveyor. The separate elevator may, however, be dispensed with; and the oxide elevated from the lower to the higher trough by the chain conveyor in its travel from the lower to the higher level. In this case the push-plates of the conveyor are pan-shaped, so that they may operate equally well as buckets in the operation of elevating; and the ends of the upper and lower troughs, near the guide-pulleys, are so shaped as to prevent the oxide from falling out of the conveyor buckets near these points. Sliding or other doors are provided in the floor of the upper trough, by opening any of which the material conveyed along the trough by the push-plates of the chain conveyor will fall into one or other of the purifiers—one opening being provided above each purifier. In lieu of allowing the oxide to fall directly into the purifier, and so collecting in a central heap, hoppers are provided, into which the oxide is discharged; and these have at the lower ends rotatable inclined shoots, down which the oxide falls into the purifier. By turning the shoots, the material discharged into the hopper may be readily distributed over the interior of the purifiers.



The illustration shows a side elevation (partly in section) of a series of purifiers, arranged in a purifier-house fitted with this improved apparatus, working in conjunction with a separate elevator.

A is the purifier-house; B, the purifiers; and C, the revivifying-house. D is a conveyor trough sunk slightly in the floor of the house; the lip of the trough being about level with the floor. Supported above the purifiers is a similar trough E. F is the chain conveyor, driven by a motor (not shown), and led around guide-pulleys H, so as to travel in one direction along the trough D, and return along the trough E. I is a hopper provided at the delivery end of the trough D. J is an elevator arranged to take its feed from the hopper I, and discharge through a shoot K into the upper trough E. The elevator may be driven by any suitable means; but preferably it is geared with the conveyor F. There are openings in the bottom of the trough E; each being provided with a sliding-door by which it may be closed. Below each of the openings, and secured to cross beams or bearers, is a hopper M. The lower end of each hopper is provided with a neck and an external flange. Around the neck, and bearing upon the flange, are placed two semicircular straps N, secured together and retained in position by bolts passed through lugs at the ends of the straps. The ring thus formed is free to rotate about the lower end of the hopper; and upon the ring are fitted or formed studs or trunnions. A tubular extension pipe or shoot P is placed below each hopper; and each shoot is provided at its upper end with a conical mouth, to which are secured hooks adapted to engage with the studs or trunnions. The lower end of the shoot makes an angle with the upper end as shown. The conical mouth has portions of its edge formed to bear against the sides of the hopper M, in order that the shoot may not be tilted out of the vertical by the weight of its lower end. When hooked in position, the shoots are capable of a horizontal rotary movement about the necks of the hoppers. By these means the oxide is re-delivered to the purifiers; and, by moving about the lower end of the shoot within the purifier, the oxide is distributed within the purifier as required.

APPLICATIONS FOR LETTERS PATENT.

18,020.—Shaw, J., and Ashworth, J. R., "Improvements in gas-engines." Oct. 21.

18,031.—Wells, G., "An improved reflector for petroleum and gas warming-stoves." Oct. 21.

18,082.—The Gas Economizing and Improved Light Syndicate, Ltd., and Love, J., "Improvements in apparatus for carburetting gas or air." Oct. 21.

18,094.—Major, J., "An improved method for utilizing gas." Oct. 21.

18,141.—Cowan, W., "Improvements in prepayment gas-meters." Oct. 22.

18,144.—Coney, J. R., and Hope-Jones, R., "Improvements in lighting and regulating the supply of illuminating gas." Oct. 22.

18,195.—Wright, F., "Improvements in meters for measuring gas or other fluids." Oct. 23.

18,206.—Carr, M. A. St. J., "Carr's curved bar roasting shelf for gas-ovens." Oct. 23.

18,213.—Harrison, J. W., Hammond, T., and Powell, W., "Improvements in the method of and means employed in charging gas-retorts." Oct. 23.

18,252.—Southall, J., "An improvement in oil and gas motor engines." Oct. 23.

18,264.—Heinen, L., "Improvements in gas-engines." Oct. 23.

18,273.—Kenyon, J., "Improvements in fittings for gas and oil burners and stoves." Oct. 24.

Reduction in Price.—The Rossendale Union Gas Company have decided to lower the price of gas 3d. per 1000 cubic feet all round, or equal to a reduction of nearly 7 per cent. The new terms come into operation at the commencement of the Christmas quarter.

Vagaries of the Electric Light at Hastings.—During a dinner given by the Mayor of Hastings, at the Albany Hotel, to the Recorder, Corporation, &c., on the 28th ult., at which were present Lord Brassey, Viscount Cantelupe, Mr. Wilson Noble, M.P., and upwards of 70 guests, the whole of the electric lights went out, and the party were in darkness until the gas could be brought into use. The Albany Hotel has recently been enlarged and redecorated, and a great feature is made of the fact, in extensively advertising, that it is the only hotel in Hastings and St. Leonards which has the electric light in *every room;* but it is added that gas is also provided. Recently the whole of the arc lights on the Parade (15 in number), and on the Hastings Pier, were out for 10 minutes. A concert was being held on the Pier; but, fortunately, the gas coronas were kept alight, and there was gas on the orchestra. The "deck" of the Pier being, however, in darkness, the attendants had to rush about and light up the gas-lamps. One or more of the Parade lights are constantly out; but as gas is also provided, very little notice is taken of it.

Australasian Gas Association, Limited.—The annual meeting of this Association will be held next Friday. The report and accounts which the Directors will submit to the shareholders show that £10,234 was received for gas, residuals, &c., and that the profit on the year's working was £3771, notwithstanding that the usual dividend (£160) on the shares in the Charters Towers Gas Company has been applied by that Company to the extension of their works. In March last the Directors declared an interim dividend at the rate of 7 per cent. per annum; and after providing for interest on loans to June 30 last, there remains a balance of £1507. The Directors recommend a similar dividend, free of income-tax, upon the amount paid up per share for the half year ended June 30 last. The report states that the Directors continue to receive from their colleagues at Melbourne favourable accounts of the works, and of their hope of shortly widening the field of the operations of the Association by the acquisition of other undertakings. It is also mentioned that during the past year 1661 additional shares have been applied for; and the Directors intend to allot the remaining 3168 of the second issue of shares at par up to the end of the present year. By special resolution, the £10 shares have been divided into two shares of £5 each.

Suffocated by Gas.—On Monday morning of last week, a mason, named Harry Williams (aged 35), was found dead at the Three Legs Inn, Leeds. The deceased slept at the inn on the previous night; and it is surmised that on putting out the gas he accidentally turned the tap again. The room was filled with gas; and the servant gave information to the landlord. He entered the room and found Williams dead, but the body was warm. An inquest was held in the afternoon, at the Leeds Town Hall, before the Borough Coroner (Mr. Malcolm). The evidence showed that the deceased was a temperate man, and that he came from Rugby. He had lodged at the house for over a fortnight. As the jury were not satisfied as to the cause of death, the inquest was adjourned for a *post-mortem* examination of the body. The inquiry was resumed on Wednesday, when Mr. Brown, a surgeon, who had examined the body, deposed that the cause of death was asphyxia due to coal-gas poisoning. The jury returned a verdict of "Accidental death."——John Hopkinson, a labourer, and Lucinda Morrison, with whom he lived in a cottage at Earby, Yorkshire, were found dead in their bed-room on Wednesday morning from the effects of coal gas, which had accidentally escaped during the night. From the appearance and position of the bodies, it is supposed that Hopkinson awoke, and, realizing his danger, bravely endeavoured to save the woman. But before he could get her out of bed, he must have been overpowered by the gas, and fallen stupefied on the floor, where his body was found. On Thursday afternoon, an inquest was held by the District Coroner (Mr. T. P. Brown). The evidence showed that there had been a smell of gas about the house for some time; and on Tuesday evening a search was made, but no escape was found. As the couple did not appear on Wednesday, the house was broken into at night; and it was then discovered that the occupants had been suffocated. Further investigation showed that gas had been escaping in large quantities. The jury brought in a verdict of "Death by misadventure."

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

The Standards Department and the Verification of Photometers.

SIR,—May we ask you to be good enough to insert the enclosed letter from the Standards Department in your next issue.

Millbank Street, Westminster, Oct. 31, 1891. ALEX. WRIGHT & CO.

[ENCLOSURE.]

Gentlemen,—Referring to your letter of the 23rd inst., respecting the verification of photometers by the Standards Department, I beg to acquaint you that the form of Evans photometer illustrated in the JOURNAL OF GAS LIGHTING of the 20th inst., which accompanied your letter, is the form which generally has been approved by the Department; but the description thereof is incomplete. I would also add that, pending the issue of official regulations on the subject, it appears to be undesirable for manufacturers to advertise the particular form of Evans' photometer recognized by the Department.

(Signed) H. J. CHANEY,
Superintendent of Weights and Measures.

[It may be desirable to remark, with reference to the subject of the above letter, that the illustrations of forms of photometrical instruments which have been published in the JOURNAL as corresponding to the requirements of the Standards Department, are not meant to indicate that no other makes of such instruments would be regarded as fulfilling those requirements. They merely represent instruments that have actually been stamped; and it is difficult to perceive how this publication of accomplished facts prejudices the future action of the Standards Department in any way.—ED. J. G. L.]

Metropolitan Water Supply.

SIR,—It is now about 40 years since the purchase of the Metropolitan Water Companies' undertakings was first proposed; and although it has been brought forward again and again since then, the actual purchase seems at the present time to be as far off as ever.

The report of the Committee of the House of Commons last year led everyone to expect that something would be done in the ensuing session; but now the question appears to be who is to incur the expense of taking it up. The Companies have had to bear enormous expenses in protecting their interests in these proceedings; and it would, therefore, be an act of wanton injustice to them if these expenses are now to be thrown away without any practical result, as seems to be likely, for want of someone to take the initiative. The Corporation, being the only public body having power to take the matter up, at their own instance, ought to do so irrespective of the position they may eventually think fit to adopt.

For this purpose, then, the following arrangements are suggested: (1) The Directors to receive the same compensation as that allowed to gas directors under similar circumstances. (2) The shareholders to be guaranteed their present dividends, but such as are not receiving their maximum to be allowed something in addition by way of prospective compensation. (3) The Companies to transfer to the Corporation all their property and effects, strictly pertaining to their water undertakings, and to retain all their other property and effects to distribute among themselves as they think fit. (4) The entire dividend to be converted into a general "Metropolitan Water Stock, at 5 per cent." (5) No money to pass between buyer and seller in the first instance; and all transactions to be carred out by an exchange of certificates as from a certain date. (6) Each subscriber to be allotted his own proportion of the 5 per cent. stock to hold or sell as he thinks fit, and to appropriate all premiums to his own purposes.

To buy up premiums in the manner formerly proposed, ought not to be entertained for one moment. Five per cent. is the highest value that ought to be given in any case for such undertakings. Beyond that the buyers ought not to go; but the vendors would be entitled to the premium value of that 5 per cent. On a former occasion, when it was proposed to buy up the premiums, Government Funds were at 3 per cent. But now they are at 2¾; and consequently a much larger sum would be required for the purpose. It would facilitate this operation if an office were established in the City, near to the Stock Exchange, and for all transactions relating to this stock to be carried out thereat.

All these matters might be dealt with by the Corporation themselves; but there are other matters that would have to be, and must be, dealt with by different persons and in a different way. There is nothing, however, to prevent the financial question being settled at once.

The quantity of water required to supply London is so enormous, and the annual increase at the present rate so large, that it would be impossible to estimate at the present time the quantity that would be required for this purpose ten years hence. It is not, therefore, a question that can be dealt with off-hand at one or two sittings, nor in a Committee-room of the House of Commons. But time must be given to consider the matter thoroughly, and to prepare a scheme dealing with the sources of supply, the mode of assessment, &c.

As a crude suggestion for a Commission for this purpose, the Corporation and each of the counties of Middlesex, Surrey, Kent, and Essex might appoint one Commissioner each, the Local Government Board and the Board of Trade one each, and the Water Companies two; and, to prevent undue favouritism in the appointments, each appointment should be made subject to the approval of all the others.

Gas and water stand upon an entirely different footing from one another. Gas is a manufactured article, and may at any time be superseded by electricity or any other manufactured article with which at the moment we are unacquainted; and therefore a sinking fund to buy up the capital within a certain number of years is a necessity, or, in any event, a matter of precaution. But water cannot be superseded. The undertakings for storing and distributing water must, for all time to come, remain and be maintained in a state of efficiency for the purposes for which they have been established; and therefore no sinking fund is required.

Oct. 30, 1891. W. L.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Thursday, Oct. 29.

(*Before Mr. Justice* COLLINS.)

The Attorney-General (on the Relation of the Local Boards of Chadderton, Royton, Crompton, and Failsworth) v. the Corporation of Oldham.

This action was brought by the plaintiff Local Boards, representing townships adjoining the borough of Oldham, under the following circumstances: By an Act of 1853, the undertaking of the Oldham Gas Company was transferred to the Corporation; and, in consideration thereof, the Corporation were charged with the payment to the shareholders of a perpetual annuity of £10,000, which was to be redeemed by a sinking fund of £2000 a year set apart from the borough fund. In 1865 the Oldham Borough Improvement Act was passed, the 96th section of which was as follows: "The Corporation may from time to time, on such terms and conditions as they think fit, supply gas or water gratuitously for any purpose of public advantage within the gas and water limits of this Act, and may supply gas gratuitously for lighting, and water for domestic and sanitary purposes to any hospitals and infirmaries, public baths, and wash-houses without those limits, maintained at the expense of the Corporation or out of the rates for the relief of the poor wholly raised within those limits." Section 97 empowered the Corporation to light with gas the streets and public buildings within the borough; and section 99 gave them power to supply and sell gas for public and private purposes within the gas limits of the Act, which included the townships of the relators—the gas-rents to be carried to the borough fund. In 1880 an Act was passed reducing the price of gas to Local Boards to 2d. per 1000 cubic feet above what was charged within the borough; and in 1886 another Act was passed limiting the profit to be made by the Corporation out of their gas undertaking. In this Act it was specified that the profit was not to be more than the annual sum payable by way of annuities created for the purchase of the undertaking, and such portion of the annuity redemption fund provided for by the Act of 1865 as was applicable to the annuities apportioned to the undertaking, together with a sum equal to 6 per cent. per annum upon £128,910, capital spent upon the undertaking up to March, 1885; upon £75,436, capitalized profits expended by the Corporation up to March, 1885; and upon such sums, not exceeding £250,000, as the Gas Committee might have borrowed for their works under the provisions of the Act. The word "profit" was defined by the Act as meaning profit made by the Corporation out of their gas undertaking after paying all expenses of the manufacture and distribution of gas, and all rents, rates and taxes, and expenses of management, repairs and maintenance, &c., in connection with such undertaking. Section 38 repealed the section of the Act of 1880 settling the price to be charged for gas; and it was enacted that the rate to ordinary consumers outside the borough was to be the same as that levied upon similar consumers within the borough. After the coming into force of the last-mentioned Act, the defendants consumed gas in the street lamps, markets, and public buildings within the borough of Oldham, and omitted to bring the value of such gas into their account of profits made out of their gas undertaking for the years ending March, 1888, 1889, and 1890, which was admitted to amount to the annual sum of £6000. The plaintiffs were, however, still charged for their lamps. The plaintiffs claimed: "(1) A declaration that, in ascertaining the profits of the undertaking for the purposes of the said Act of 1886, there should be taken into consideration the value of the gas used by the defendants for street lighting and other public purposes within the borough. (2) An injunction restraining the defendants, their servants and agents, from using gas for the street lamps, market, and public buildings within their borough, or (in the alternative) from so doing without crediting the value thereof in the revenue account of the gas undertaking, or allowing for the cost thereof in ascertaining the profit of the undertaking, or without charging the borough fund, or general district fund, or other proper fund, the value of such gas, unless (in the alternative) the defendants supply, within the respective districts of the plaintiffs, gas gratuitously to the street lamps, markets, and public buildings." In the statement of defence prepared on behalf of the Corporation, the question at issue was dealt with as follows: "(1) The Corporation admit that, since the coming into force of the Act of 1886, they have consumed gas in the street lamps, markets, and public buildings within the borough, and that they have not brought the value of such gas into their account of profits made out of the gas undertaking for the years ended March 25, 1888, 1889, and 1890; but they deny that their omission so to do was improper or contrary to any Act of Parliament. (2) For the purpose of this action, they are willing to admit that the annual value of the said gas is £6000. (3) They deny that the value of the gas is 'profits' within the meaning of the Act of 1886, or that they must so treat it in their accounts. (4) They deny that the Local Boards have been deprived of any benefits to which they were entitled under the Act of 1886, or that they have reduced the profits of the gas undertaking improperly. (5) They deny that, if they light the borough with gas for public purposes without bringing the value thereof into their account of profits, they must supply gas gratuitously for such public purposes to the Local Boards within the limits of their Gas Acts. (6) Since the coming into force of the Act of 1886, the defendants have supplied and sold to the plaintiffs gas for the lighting of the streets and public buildings within their respective districts on terms agreed on within the provisions of sections 98 and 99 of the Oldham Borough Improvement Act, 1865. (7) The defendants contend that, under the Act of 1865 and otherwise, they have a discretion to light with gas the streets and public buildings within the borough without bringing the value of the gas so consumed into the account of profits made out of the gas undertaking, and without at the same time supplying gas gratuitously for the lighting of the streets or public buildings beyond the borough and within the gas limits. (8) By the Oldham Borough Improvement Act, 1865, it is enacted as follows: Section 5—'This Act shall . . . apply to and within the borough exclusively.'

Section 292—'In case the borough fund is at any time insufficient to pay the expenses aforesaid [being the expenses referred to in section 291, sub-section 2, of the said Act, as set out in the statement of claim], the Council shall from time to time, annually or oftener, as and when they think fit, estimate as correctly as may be the amount in addition to the borough fund which will be sufficient to pay the expenses aforesaid, and shall raise the same by means of a rate called the borough rate; and, accordingly, such a rate the Corporation shall . . . make, assess, and levy.' By the operation of sections 5, 291, and 292, the cost of providing the gas referred to in the first paragraph is borne by the ratepayers in the borough exclusively, and not by the ratepayers in the plaintiff townships. (9) The defendants further contend that the statement of claim does not disclose any cause of action."

It was contended, on behalf of the plaintiffs, that the gratuitous supply by the defendants deprived them of the benefits to which they were entitled under the Act of 1886, by improperly reducing the profits of the defendants' gas undertaking by the above-mentioned sum of £6000, thereby preventing the reserve fund from being made up, and evading their obligation to reduce the price of gas after the maximum legal profit had been made; that the value of the gas was "profits" within the meaning of the Act of 1886; and that, if the Corporation wished to supply gas gratuitously, it must be to all the persons within the limits prescribed by the above Acts. For the defendants it was argued that the Corporation were empowered, by section 96 of the Act of 1865, to supply gas gratuitously for "any purpose of public advantage," and that the supply to the street lamps was a public advantage. It was a burden imposed upon the Corporation, and not a profit which ought to have been taken into account; and they maintained that "ordinary consumers" meant private consumers, and did not apply to the plaintiffs.

The ATTORNEY-GENERAL (Sir R. E. Webster, Q.C., M.P.), Mr. LITTLER, Q.C., and Mr. DANCKWERTS appeared for the plaintiffs; Sir H. JAMES, Q.C., Mr. MOULTON, Q.C., and Mr. MARSHALL represented the defendants.

Justice COLLINS, in giving judgment, referred to the various Acts of Parliament as above set forth, and said it had been contended first that section 96 of the Act of 1865 did not empower the Corporation to light the streets of Oldham without making some charge therefor; and if it did enable them to do so, then that the person who supplied was the same as the person receiving, and the supply could not be called gratuitous. As to the first point, it had been argued that the lighting of public streets was not a public advantage within the meaning of the Act; but it seemed to him impossible to deny that it was. He could not conceive anything more public than the lighting of streets; and there was no *primâ facie* presumption against the right of the Corporation to gratuitously supply the gas for such lighting. As to the argument that there could not be a gratuitous supply by a person to himself, and that it must be to some other person than the Corporation, a subsequent part of section 96 dealt with a gratuitous supply to any institution supported by the Corporation; and therefore it seemed that the Legislature did not intend that the gift should be to someone other than the Corporation itself. Supposing there had been a gift of a fountain, why should not the gratuitous lighting of that fountain come within the powers of the Act? As to the question whether the cost of the public lighting was "profit" which ought to be taken into account, the argument that it was so was a fallacy. The Act, when it alluded to profit, referred to the profits of the gas undertaking. There was another reason: The ownership of the lamps was vested in the Corporation; but the gas was supplied to the public. It was a benefit bestowed upon the public at large; and it could not be said that the persons who supplied it made a profit by it. Could it be contended that the Corporation, having power to light their own hospitals gratuitously, made a profit by doing so? It seemed to him that the plaintiffs' case failed; and consequently there would be judgment for defendants.

Upon the application of Mr. DANCKWERTS, stay of execution for a fortnight, pending appeal, was granted; the plaintiffs undertaking to proceed with reasonable speed.

CENTRAL CRIMINAL COURT—Tuesday, Oct. 27.

(*Before Sir* THOMAS CHAMBERS, *Recorder.*)

The Alleged Attempt to Bribe the Salford Gas Engineer.

To-day, Mr. *Sydney Kershaw* surrendered to his bail, to answer an indictment under the Public Bodies (Corrupt Practices) Act, 1889, by which it was alleged that he had offered a gift to the Salford Corporation Gas Engineer (Mr. S. Y. Shoubridge) in order to induce him to advise his Committee to accept certain tenders for coal. It will be remembered that at the recent Quarter Sessions at Salford a true bill was found against Mr. Kershaw, and that the venue was transferred to London by order of the High Court. The defendant pleaded "Not guilty."

Mr. WADDY, Q.C., M.P., and Mr. COTTINGHAM appeared for the prosecution; Mr. W. BOWEN ROWLANDS, Q.C., M.P., and Mr. M'KEAND for the defendant.

Mr. WADDY said the offence in the present case, although very wrong and shameful, was not a very well known one, inasmuch as the statute constituting the offence was passed only two years ago. He ought to say, first of all, that some few years since a considerable amount of interest was excited in consequence of very large transactions of the character in question on the part of persons who were anxious to gain unlawful advantages over their competitors in trade. Certain commissions were perfectly legitimate in their way; but the habit grew up very largely indeed in Salford, of underhandedly bribing the officials of the Corporation so as to get an unfair advantage in the matter of contracts. A legal exposure at last took place; and the result was the passing of an Act intended to put a stop, at once and for ever, to these nefarious practices. The excuse which the defendant had set up since the discovery in this case was one which, if he read the statute aright, did not help him in the least. The charge was that he had "corruptly" offered this consideration for the purpose of obtaining an undue advantage. It did not matter whether the bribe were given beforehand or afterwards, as long as that bribe was given with the view to the obtaining of business by an unfair advantage and by unfairly operating on the mind of a servant of the Corporation. It did not matter whether this was a promise or an offering. It was in this case an offering, because, much to his credit, the gentleman to whom it was made indignantly repudiated it. The offence which the Act had in view was that of "corruptly offering a gift to a person as an inducement to or reward for an officer or servant of a public body doing or forbearing to do something in respect of a matter in which such public body is concerned." Salford was a place with a population of 252,000; and, of course, the supply of gas to so large a town entailed the purchase and consumption of vast quantities of coal. Previous to the date at which the events connected with the charge occurred, the defendant had a contract with the Corporation for something like 5000 tons of coal; and at the time he called upon Mr. Shoubridge, this contract was shortly to expire. It was a matter of common knowledge that the Gas Committee were about to advertise for fresh tenders; and an advertisement was issued on May 14 last. On April 22, the defendant called upon Mr. Shoubridge; and some conversation took place which would be recounted to the jury by witnesses. In this conversation there was not a word said (and this was very important) about previous contracts, or about any mercy having been shown to him, or anything of the sort—that excuse was set up later. But the defendant had never denied a word of what Mr. Shoubridge had said; and he (the learned Counsel) did not think there would be any attempt by evidence to deny it that day. The whole question appeared to be as to the construction of the statute, and how far the indisputable facts applied to it. When Mr. Kershaw called upon Mr. Shoubridge, he intimated to him that he intended to put in a tender offering a much larger amount of coal than before, and said he was very anxious to get the contract. Mr. Shoubridge replied, "Very well;" and Mr. Kershaw thereupon drew an envelope from his pocket, saying, "I hope you will allow me to present you with this." As men of the world, bearing in mind what had occurred just previously, he did not think the jury could have any doubt as to what this meant. Mr. Shoubridge was very indignant. He refused to have anything to say to Mr. Kershaw, and consulted Mr. Holland, the Chairman of the Gas Committee, as to the course to be pursued. They decided that if Mr. Kershaw sent in a tender, after what had occurred, Mr. Phillips, the Deputy-Chairman of the Gas Committee, should be informed of his offer to the Engineer. The tender was sent in on May 25; and it directly became the duty of Mr. Phillips to make the matter one of investigation. The result was an interview between Mr. Phillips and the defendant, in which Mr. Phillips stated his views; and on June 18 a letter was written to Mr. Phillips in these words: "Dear Sir,—I am grieved indeed to learn of the grave charge the Gas Engineer has brought against me. In justice to myself, I beg you to grant me a hearing, when I hope to be able to explain the matter somewhat." Probably it would occur to the jury, Mr. Waddy remarked, that that was about as feeble a letter as any mortal man could have written in the circumstances; and it contained no justification or excuse whatever. The defendant wrote another letter on June 25 to the Gas Committee, in which he said: "Gentlemen, I thank you very much for your kindness in allowing me the privilege of making a full explanation respecting the charge referred to in my letter to Mr. Phillips of the 18th inst. Last Tuesday week I saw Mr. Rudman, and asked him when the coal contracts were likely to be decided. He, in a very pained manner, answered me by saying that I had attempted to bribe the Gas Engineer by offering him something in an envelope. I grieve to say I did offer him the envelope; but certainly not in the nature of a bribe." He then went on to explain that he had done so as a recognition of courtesies and indulgences by the Gas Engineer during the existing contract, in not complaining at certain delays in delivering coal, owing to the coal running short, or horses being unfit for work. He went on to write that, when thinking of these kindnesses, "I felt an irresistible impulse to show my appreciation of Mr. Shoubridge's kindness in some way; and I very improperly enclosed him a present which he very properly returned. When I did that, I had no thought whatever of future contracts; it was a stupid, foolish, and very wrong thing to do. I apologize to you, gentlemen, and Mr. Shoubridge for having offered him this insult." The letter went on to refer to the writer's 20 years' residence in Salford, and concluded: "I appeal to you, gentlemen, to forgive this one act of indiscretion, and not to blight my name and all I have been working hard for during the last 20 years by placing me on the Committee's black books." The excuse which was here made, Mr. Waddy said, was that it was an acknowledgment of past kindness; but he submitted that it did not matter whether the gift was made before or after, whether it was made in consideration of getting things cheaper or dearer. The law said that, if they were to deal with a public servant behind the back of his employers, they must not have transactions which might tend to influence him or to modify in any degree his judgment with regard to any of these matters. The statute, therefore, dealt not only with promises for the future, but with rewards for doing or forbearing to do anything in respect of any matters or transactions whatsoever, actual or proposed. The question, therefore, which he had to submit to the jury was whether this was a matter or transaction, actual or proposed, in which a public body was concerned.

Mr. BOWEN ROWLANDS said that his learned friend was right in understanding that the defendant's explanation was that the gift was offered as a recognition of past courtesies and had no regard to a future contract. He submitted that sub-section 2 of the statute did not include anything of that sort; and therefore he asked his Lordship whether he would now tell the jury what his interpretation of that section was, or whether it would be more convenient to hear the evidence first.

The RECORDER said that it must be a question of fact; but on the facts he would ask the jury whether, in the terms of the sub-section, they found, or did not find, that the prisoner corruptly gave his money as an inducement to the servant of a public body.

Evidence was then called on behalf of the prosecution.

Mr. *Arthur Holmes*, Deputy Town Clerk of Salford, was the first witness; and he produced the books of the Corporation containing the minutes, letters, &c., having reference to the matter. He also produced the fiat of the Attorney-General authorizing this prosecution.

Cross-examined: He was aware that the Attorney-General at first refused his fiat for prosecuting in this case.

Re-examined: He could give no reason for the refusal of the fiat for the prosecution in the first place. It had since been granted, and was in the Court.

Mr. *S. Y. Shoubridge*, the Gas Engineer to the Salford Corporation, was next examined; and, in the course of his evidence, he stated that the Gas Committee obtained the supply of coal for the gas-works by tender, and the contract which was running at the time of these occurrences was made in October, 1889, being for two years. When tenders were sent in in response to advertisements, witness was instructed to go through and tabulate them, to secure samples of the coal, and to analyze them. On April 22 last, Mr. Kershaw called upon him. At that time fresh tenders were to be obtained. Mr. Kershaw said, "My contract with the Corporation is nearly completed; and I hope it has been carried out to your satisfaction." Witness replied, "I had no reason to complain of the coal." Defendant then said, "I suppose you will soon advertise for fresh tenders?" He answered, "Yes, the advertisements will appear directly." Defendant said, "I intend to tender for a larger quantity of coal, and also for cannel; and I hope I may be successful in getting the contract." Witness said, "If the coal is of good quality, and your price low, I think you stand a very good chance of doing so." He then referred to the pleasant manner in which the existing contract had been carried out, observing that he hoped the new one would go on as pleasantly as the one running out. He then put his hand in his pocket, took out an envelope, and said, "I hope you will accept this." Witness replied, "I cannot accept anything;" and defendant remarked, "I hope I have not offended you, and that you do not think I am offering you a bribe, for I have no such intention. I merely wish to show you my appreciation of your courtesy and kindness in carrying out my present contract." He then rose to go, and said he should send in his tender at the usual time. Witness afterwards communicated with Mr. Holland, the Chairman of the Gas Committee, who decided to take no steps until it was seen whether the defendant did send in a tender. He did, in fact, tender on May 25. The Deputy-Chairman was informed of what had taken place; and the facts were communicated to the Committee, and the tender was struck out.

In cross-examination, witness said his duty as Engineer was to advise the Corporation as to the tenders. He would be in the room when the tenders were considered, and would have to analyze the coal. He would not be consulted by the Committee as to the personality of the person tendering. For Mr. Kershaw's convenience, he offered to test some of the coal which had been offered to him; and he also, on one occasion, did not press Mr. Kershaw to deliver certain coal at the time fixed by his contract. On one occasion Mr. Kershaw complained that his horses were suffering from "pink eye." On another occasion, the deliveries were delayed by bad weather. The gates were sometimes kept open later than usual, to meet Mr. Kershaw's convenience. The relations between him and Mr. Kershaw were of a very trifling nature. At the interview as to which he had given evidence, there might have been a conversation as to testing some cannel coal. It was arranged at one interview that a waggon-load of the coal should be sent for testing. Mr. Kershaw certainly professed to be beholden to him for courtesies shown him, and produced the envelope. Witness did not know what was in it. Mr. Kershaw disclaimed any intention of offering a bribe; and he subsequently wrote for forms of tender, which witness supplied. Later on he told him the method and manner of his tender were satisfactory. Witness never intimated to Kershaw that he had reported what had occurred. He saw Kershaw on April 22, and did not tell him the charge had been made against him. Witness had no authority to accept the tender; and therefore could not tell him that his tender would not be accepted.

Mr. ROWLANDS: Did you consider Mr. Kershaw had tried to bribe you?

Witness: I did not consider what his motive may have been. I thought it might partly refer to the past and partly to the future.

Did you not consider it as a mere joke when you mentioned the matter in the first instance to the members of the Corporation?—Certainly not. I thought it serious.

Why did you not communicate with Mr. Kershaw and warn him that the Chairman of the Committee proposed to wait to see if he sent in a tender before taking action?—I should have thought it most improper to have written and told him not to send in a tender.

Re-examined by Mr. WADDY: He had shown no more and no less courtesy to Mr. Kershaw than he would have shown to any other contractor.

This closed the case for the prosecution.

Mr. BOWEN ROWLANDS then addressed the jury on behalf of the prisoner. He said that there was no doubt this case was a serious one. Mr. Shoubridge had told them it was a serious case, and he would have the jury to believe that it was his opinion at the time when the gift was offered to him that it was a serious matter. He (the learned Counsel) ventured to think that he had considerably enhanced his view of the seriousness of the affair, and had entirely changed the aspect in which he regarded it since he found out that that august body the Corporation of Salford made it imperative that they should take action against someone, and find a scapegoat for the purpose of whitewashing their own reputation. He (Mr. Rowlands) was prepared to maintain that the offence, whatever it was, which the defendant committed was not such an offence as was contemplated by the Act of Parliament. The preamble of the Act stated that it was expedient to provide against bribery and corruption of and by the members and officials of corporations. His friend Mr. Waddy, in his opening, stated that there had been bribes, and rumours of bribes, in connection with the Salford Corporation, and that it was in consequence of this that the Act had been passed to put a stop to these attempts to influence unfairly the officers of the Corporation in cases where one trader was competing with other traders, who would thus be placed at a disadvantage. He accepted that this was the object of the Act, and that this was the mischief which it was intended to meet. The second section provided that any person who corruptly offered any gift or reward or advantage whatever, whether for the benefit of the person to whom the offer was made or for any other person, as an inducement to any official of a public body to do anything contrary to his duty, or abstain from doing anything which it was his duty to do, should be guilty of a misdemeanour. His contention was that this pointed to a class of offence wholly distinct from that which, if they believed the defendant's letter, the defendant had committed. There was another point, and that was as to the reason why the responsible officers of the Crown had hesitated to grant their fiat for the prosecution. It was not for him to express an opinion as to what the reason for the hesitation was; but he was justified in thinking that it might be because there was some doubt as to whether any offence had been committed which came within the scope of the Act.

Mr. WADDY: The reason for the delay was that no Counsel's opinion had been brought before the officers of the Crown.

Mr. ROWLANDS said he would accept that explanation to the full; and he would say that Mr. Waddy's mode of conducting his case compared very favourably with that pursued by the Salford Corporation. But the very fact that Counsel's opinion had not been brought forward, and that the highest legal authorities hesitated on that ground to issue their fiat, of itself showed that the case was by no means clear. Proceeding, the learned Counsel said that the mischief at which the Act aimed pointed to a class of offence wholly distinct from what Mr. Kershaw had admitted in his letter of June 25; and even the highest legal authorities had hesitated to take action upon it. He put it to the jury, as men of common sense, that the statute was not addressed to such an act as Mr. Kershaw had committed, imprudent as that act might have been. The Chairman of the Gas Committee himself delayed taking action upon it. He said, "Wait till we see if Mr. Kershaw puts in a tender." What did that mean? Were they trying to lay a trap for him? Why, if the Chairman and Mr. Shoubridge thought the offence was so serious, should they have waited? He submitted that the real truth was that at that time they did not believe it to be serious; and that it was only after the necessity had arisen for whitewashing the Corporation, that they resolved to take action upon the matter. He submitted that Mr. Kershaw's explanation of his reason for making the offer to the Gas Engineer was a very reasonable one. He had been beholden to Mr. Shoubridge for many acts of courtesy; and he did not believe for a moment that he would be violating his duty in offering him some recognition of these courtesies. If this was so, would the jury say that it was a corrupt action? Did they believe that, if he had thought it was corrupt, he would have gone on tendering for the new contract? Did they think that if Mr. Shoubridge or the Chairman of the Committee had shown him by their manner that he had been guilty of an insult or an attempt to bribe, he would have put his head into the noose by sending in a tender? He asked the jury to decline to give their fiat in favour of prosecutions of this character, which, he submitted, were not within the intention of the Act.

No evidence was called on behalf of the defence.

The RECORDER, addressing the jury, said that the Act under which the prosecution was instituted was intended to protect the public from the consequences that flowed from the bribery of public officers. Therefore nothing more wholesome in the way of legislation could be imagined. In examining the evidence, he asked the jury to consider whether the defendant's offer of something in an envelope to the Gas Engineer on April 22 was an attempt to bribe that official in the discharge of his duty; or, on the other hand, was it an honest offer of some acknowledgment of the courtesy, forbearance, and indulgence shown by the Engineer in the carrying out of the defendant's expiring contract. One unavoidable circumstance or another had thrown difficulties in the way of the regular delivery of the coal. A contract of that kind always provided for the times and the quantities of the various deliveries; and Mr. Kershaw had been unable scrupulously to adhere to those conditions. He had asked for forbearance and indulgence; and Mr. Shoubridge, being an officer in a position of some authority, had shown him as much forbearance as he could consistently with his duty to the Corporation. This was a matter for which praise rather than blame attached to the Engineer. It was very desirable that an officer in such a position should act indulgently towards tradesmen struggling against difficulties, provided they could do so without neglecting their duty to their employers. That was not all. Mr. Shoubridge had offered to test coal for the defendant during the currency of his contract. It had nothing to do with the business of the Corporation. Mr. Shoubridge offered to Mr. Kershaw the benefit of his skill as an analyst in his business with other persons. The single question for solution was, Did the defendant in his conversation with the Gas Engineer make a corrupt offer? Did he offer something with intent to influence his conduct as a servant of the Corporation, and especially of the Gas Committee? Did he intend to influence the Engineer in his consideration of the tenders which the different coal contractors were about to send? If no tender had been afterwards made by the defendant, the matter would have dropped, because he could not be charged with attempting to influence the conduct of an officer in relation to a tender never sent in. Mr. Shoubridge said that the offer of something to him in an envelope was, in his opinion, an attempt to corrupt him. Whether it was a corrupt offer to influence him in connection with the coal tenders was a question of fact for the jury to decide. It was not a question of law. If the jury answered that question in the affirmative, the defendant was guilty; if in the negative, he was not guilty.

The jury at half-past twelve were directed to consider their verdict; and after 15 minutes' deliberation, they intimated that they could not agree.

The RECORDER: You had better retire to consider the verdict.

A JURYMAN: We should like to know whether or not the envelope contained money.

The RECORDER: That does not matter; the defendant put it as an acknowledgment of the favours received, you can judge from that what the contents were.

The FOREMAN: Had Mr. Shoubridge the entire fixing of the contract?

The RECORDER: Of course, he had no direct veto; but he was the official specialist appointed with the duty of advising the Gas Committee on these matters. It was his express duty.

Mr. COTTINGHAM: It was his duty to advise the Committee as to the acceptance of the contract.

Mr. ROWLANDS: I must object to these statements. They are not in evidence.

The RECORDER: Yes, Mr. Shoubridge, in his evidence, said he had to advise the Committee, and to analyze the coal.

Later on the jury asked, if this money was given for services rendered, did it come within the Act.

The RECORDER: If it were exclusively an acknowledgment of kindness shown, then, although very indiscreet and out of taste, it would not come under the Act; but the jury must consider the tone of the conversation at the interview at which the offence was alleged to have been committed.

Mr. ROWLANDS: May I point out that Mr. Shoubridge in his examination said he took the offer as partly in acknowledgment of services rendered in connection with the testing of the cannel coal.

The RECORDER: Yes, partly, but he also indicated that in his mind it was also proffered with another purpose.

Mr. COTTINGHAM: I may point out that the section lays it down as an offence to attempt to influence an official's conduct in any transaction of this character.

The RECORDER: Yes, but you cannot influence his conduct on transactions already passed.

The Jury, after an hour's consultation, were unable to agree to a verdict, and were discharged.

It was then arranged that the case should stand over till next session, the defendant being admitted to bail as before.

COUNTY OF LONDON ASSESSMENT SESSIONS.

Sessions House, Clerkenwell, E.C.—Friday, Oct. 16.

(*Before Sir* P. H. EDLIN, Q.C., *Chairman, and a Bench of Magistrates.*)

The Gaslight and Coke Company's Assessment Appeals.

(*Continued from p.* 764.)

On the resumption of the proceedings to-day,

Mr. *W. Eve*, in cross-examination by Mr. LITTLER, stated that the sum of £8216 which he had allowed for the fixing and repair of stoves had been taken from the Company's accounts. At the time this expenditure was made, the charge for laying on did not represent anything like the actual cost to the Company; but when fixed these stoves would, of course, help to augment the Company's income. It was impossible for him to say to what extent the stoves increased the profit, the register being through the same meter as the burner consumption. Asked whether it was not common knowledge that the stoves absolutely doubled the daylight consumption of gas, witness replied that this depended upon the extent to which they were used. He had never heard of such a statement before; but if this were the case, no doubt it would add a very material item to the receipts.

Mr. LITTLER: If it has cost £37,508 for fixing and repairing stoves to earn this amount, why is not that as fairly to be charged as the expense of manufacturing the gas?

Witness: Because much of that cost is not in respect of the earnings of the year. The £37,508 is made up of various items, including £8552 for depreciation of stoves. I say that is a most excessive depreciation on the amount of stoves which they have in stock. I again say that many of these expenses are incurred to create a business; and that the cost thereof should either be carried to the capital account or distributed over a series of years. Much of this expenditure has not yet produced any fruit. Then in the account year they spent £11,046 under the head of wages only for fixing stoves. I suggest that a great deal of this expenditure relates to a future disposal of gas. Very much of this charge in the account year is to create a business, and should be distributed.

As part of the £8216 is due to matters of permanent work, which you say should be spread over a number of years, how much have you allowed me in that £8216?—I have not divided it.

Then it is a guess?—No, it is an actual receipt. The £8216 is more than the figure at which I ascertained from a manufacturer that he would supply all the stoves and repair them.

Cross-examination continued: Certainly some people who have hired gas-stoves give them up. I do not know how many thousand stoves the Company have out; but it is an increasing number. It does not surprise me to hear that 5455 stoves were fixed in one half year.

Mr. LITTLER: Suppose you find the wages for fixing, removing, and repairing stoves are £11,000, do you not think a great deal of that is a current expense?

Witness: No. I am not aware how much is for repairs or how much is for removing. I do not know that a comparatively small portion of it may be for fixing; I have no subdivision.

Then on what grounds do you challenge this item?—I believe, from information obtained, that a manufacturer would supply all the stoves the Company need for the amount which they receive from them.

Then, in your judgment, these people, who are professed gas managers, are throwing away £30,000 a year?—No, distinctly no; because they are creating a business.

Do you know that the experience of every gas company is that, so far from the expense diminishing, which it would do if it were merely creating a business year by year, these gas-stoves are an increasing item?—I am aware of it; and an increasing result is produced.

You object to a portion of the management charges, as I understand, on the ground that that is a landlord's business?—The expenditure of £61,093 relates to the whole hereditament of landlord and tenant, also to extensions, and all matters included under that head. In the account year, the capital expended was, I believe, £116,122. The wisdom of expending this was dealt with by the Company's officials under the head of "management."

Can you give the Court any figure by which you would reduce this item by reason simply of the additional staff required for the extensions?—I have reduced it by £5500, which I thought was fair.

Do you know how much in this £61,000 is for the Engineer's salary?—I do not. It does not matter to me where the Engineer's salary is—whether it comes under the head of "management" or under the various other heads. I simply say that that official is executing certain duties which would not devolve upon a tenant; and that we must be allowed something in respect of that.

Mr. LITTLER: "Salaries," under the head of "management," do not include the salary of the Engineer.

By the CHAIRMAN: If, as a matter of fact, the Engineer's salary is not included in the £61,093, then I think credit must be given for it in the item of "salaries" under the head of "manufacture."

The CHAIRMAN: As between the landlord and the tenant, the services of the Chief Engineer must be divided. He must be performing certain duties which will properly devolve upon the landlord; and if, in the case of this Company, the landlord has the benefit of the same person, some portion of such salary should be relegated to the costs of the landlord, and could not be properly entered into the tenant's accounts.

The SOLICITOR-GENERAL: That is the point. We have taken off about one-twelfth, and attributed it to the landlord—that is really what it comes to.

Mr. LITTLER (to witness); In a gas case or in a water case, have you ever suggested that the salaries should all be reduced because of extensions?

Witness: So far as I can remember, for the last ten years, I have in every case valued on the assumption that the total expenditure under the head of "management" should be reduced; but this is the first time I have suggested it in this way. I have practically knocked off the sum which is paid for the Directors.

On what ground do you say that the parliamentary charges are the landlord's?—When they relate to anything which does not come within the tenant's duty, they are landlord's charges. I know some of these cases, because I happened to be a defendant in an action which the Company brought in the case of a steam-roller breaking one of their pipes. What I heard yesterday I cannot conceive of—viz., that some of this expenditure was incurred in resisting powers which the Vestries of the Metropolis were seeking to maintain; that is to say, they might use these rollers, and not be answerable for any breakage.

Who is responsible for an explosion of gas, the tenant or the landlord? The tenant, surely?—In the case I have referred to, we were responsible.

As between landlord and tenant, suppose it was under such circumstances that the owner or occupier of the works was responsible, whose charge would you call it—the landlord's or the tenant's? Suppose a pipe was not made good, and an explosion happened; that is a tenant's charge, is it not?—Who breaks the pipe? That is what I want to understand.

Assume it is under such circumstances that either the landlord or the tenant would have to pay for it, which would you say would have to be the paymaster?—In the cases I have had, neither was responsible.

When there is a large escape of gas, who loses the gas, the landlord or the tenant?—The man who does the damage has to pay for it. It is to the interest of the tenant to prevent anything which would cause an escape of gas.

The CHAIRMAN: Can you reasonably say that the Bill opposed by the Company was not one that might not have been of serious consequence to the tenants, and that it was not part of their duty to watch its progress in Parliament, in order to see that it might not contain any clause affecting their property?

Witness: I suggest that it is not their property, but the landlord's.

I speak of them as tenants?—I say that would be a landlord's duty. If the two interests were divided, the tenant would say: "You let me a hereditament protected and hedged round by certain conditions. I obtained an Act of Parliament, and ascertained from other cases that, if my pipe is broken by a steam-roller, I shall be compensated. But circumstances are altered now; and I find that I shall not be compensated. This is a vicissitude which interferes with the value of your hereditament; and therefore I will not pay you so much rent."

A copy of the Bill opposed by the Company was then promised to be handed in, to enable the Court to ascertain whether the expenses of such opposition should be apportioned, or whether they should be relegated exclusively to the landlord or to the tenant.

Mr. LITTLER said that the parliamentary charges for the account year included appearances upon thirteen schemes for the supply of the electric light, the cost of such attendances being £3893. (*To Witness:*) Is it not a fact that all these different Acts of Parliament would, unless the Company were protected, increase the obligation of those who were trading in the supply of gas?

Witness: It would increase the obligation of the Company. But I suggest that the electric light business is not a recurring figure every year; and therefore ought not to be allocated to this year. I think it ought to go out altogether. If I am wrong in that opinion, then I say it is not a recurring item, and ought to be distributed.

Cross-examination continued: For superannuation I have allowed £10,069, as against Mr. Jones's £18,346. First, I have disallowed £4921, the amount paid to officers compulsorily retired under Schemes of Amalgamation. That, I say, is a landlord's payment, in order to get his hereditament into a condition to let to the hypothetical tenant.

The landlord, in order to get increased rent, goes about and arranges the amalgamation of companies which are expensively administered. Various amalgamations in the Metropolis have reduced the number of Gas Companies to three; and the wisdom of this proceeding was quite apparent. The Companies were working at very much greater expense separately; and therefore each particular undertaking would not let to a tenant at so much rent as the amalgamated undertakings do. It is therefore to the interest of the landlord to say: "I will get rid of these officials, and pay them £4921 a year, because my rent for these hereditaments when consolidated will be greater than it was before the amalgamation."

If we do not charge this £4921, it will leave £13,425; and I allow three-fourths of that sum—viz., £10,069—because in my judgment there should be the same allowance made for annuities for the first year of a company's existence as for its fiftieth year.

Mr. LITTLER: In your table you say, "Estimated receipt arising from a further increase of 3d. per 1000 cubic feet, which would doubtless have been made had not the Company had funds in hand to enable them to pay the maximum dividend." On what principle do you speculate in that way?

Witness: The effect of raising the price 3d. has been that, while the development of the Company has been somewhat retarded, they have still done a larger business at the higher rate.

If we had charged the extra 3d., we should have reduced the dividends received by our shareholders?—The point is what the landlord would say. The tenant would say to the landlord: "I have so much to pay for coals, and I want my rent reduced." "No," the landlord would reply; "I will have nothing to do with that. You have the power, under your Act of Parliament, to increase the price, and you must have less dividend. If you are not satisfied with less dividend, somebody else must have it." This Company only had their 10 per cent. a few years ago; and by increasing the price 3d., they would still get up to the 10 per cent.

In further cross-examination, witness said he was quite willing to admit that it had been the general practice of the Court to allow the tenant 17½ per cent. on some points; but he submitted that the circumstances had altered. This was a monopoly of the supply of gas; and any one percentage was inapplicable to all the circumstances. He considered that a railway should have a larger percentage than a gas company. If a person wished to go to St. Alban's, for instance, he could go by one of three railways or by a coach; but, if he wanted gas in the appellant Company's district, he must go to the Company. In this case he would give 15 per cent. right through; or, dividing it up, he would allow 17½ per cent. on some part of it, and 10 per cent. on the other.

Mr. LITTLER quoted the decision in the Midland Company's case, in which it was stated that 17½ per cent. was allowed in accordance with the practice of the Court.

The CHAIRMAN said he was not a member of the Court which heard that appeal; but he took the opportunity, shortly after the decision was given, of conferring with the gentleman who presided on that occasion. He had never understood that there was a hard-and-fast percentage fixed, without regard to the magnitude of the undertaking; and he had never looked upon the 17½ per cent. as an immutable rule. He had anticipated that the time would arrive when the Court would have very seriously to consider whether they should regard that allowance as one necessary to be made in respect of a particular company, the capital of which was very large, and having regard to the expenses and all the other circumstances attending it, more particularly when the Court had to deal with a monopoly. He was not in any way prejudging the question; but he had no hesitation in saying that the Court, so far as he was aware, had never accepted 17½ per cent. as being necessarily the allowance to be made.

Mr. LITTLER said he would not suggest that it was an absolute rule; but he should argue that the 17½ per cent. was applicable to this case.

In further cross-examination, witness said that, in spite of the advance in the use of electricity, the consumption of gas had increased. He had allowed reasonable working expenses, but not creating expenses. No parish had yet been successful in obtaining the electric light at a cheaper rate than gas. He was aware that, in consequence of the competition of paraffin, the Company had been encouraging weekly tenants to take gas. The expenses of collection in these cases had been included in the accounts. This did not look as if the Company were hard pressed; in fact, the Directors spoke in favour of the practice, and of extending it.

Mr. LITTLER: In what sense is gas a monopoly? There may be a monopoly of gas; but there is no monopoly of light?

Witness: That I did not say. The "monopoly of gas" was my expression, and that monopoly is complete.

Does it matter whether it is a monopoly of gas or not, when there are other means of lighting, any more than it matters when there are three railways going to the same place?—Yes; until you admit that the other things are better than gas and cheaper.

In further cross-examination, witness stated that, for the purposes of rating, the landlord did all the repairs. What they had to ascertain was what the tenant would give from year to year; and a yearly tenancy, as a rule, in almost every undertaking he was acquainted with, involved the landlord doing the repairs, although, for the convenience of dealing with the matter, no doubt the tenant would do them. The proposition the other side was seeking to put forward was that the landlord would say to the tenant: "Sooner than do these repairs myself, I will allow you this money with which to do them, and 17½ per cent. interest on it." He (witness) could not conceive a landlord doing any such thing. Asked if he could imagine any landlord undertaking the duty of being on the spot, and repairing every broken main within 24 hours after an accident, which was, it was pointed out to him, what the appellants were bound to do under an Act of Parliament, he said this formed only a very small portion of the £278,385 allowed for repairs to works and plant. A stove, when put into a house, became part of the hereditament. The difference between a stove and a meter was this—that the latter was merely a machine which used in most cases to settle what payment should be made by the consumer to the supplier; whereas a gas-stove was just the same as an ordinary stove in a house—and kitchen ranges were rated. He did not allow anything for retorts, because they were the landlord's property, and must be repaired by him. The Courts had settled that retorts would go to enhance the value of the hereditament, and were not chattels. He drew this line—if things were a part of the hereditament to be assessed, then they came under the landlord's liability; if not, they were the tenant's. Asked what profit a landlord would expect if he had every 2½ years to set up these retorts, and it being put to him whether any man in his senses would undertake the working, providing, and setting of retorts, and looking after them, especially in somebody else's business, unless he had 17½ per cent. upon the cost, witness said, if that was right, he must increase the amount, as he had only put down 5 per cent. He had disallowed the whole of this item of £324,199 for repairs, because the tenant would not have to provide it. In reply to further questions, he said he had reduced the £157,439 for stores to £40,000, and the £170,801 for loose plant to £80,000, because the higher figures included both the tenant's and the landlord's liabilities; and he pointed out that while the South Metropolitan Company, which was one-third of the magnitude of the appellant Company, claimed only £10,000 for their loose plant, he was allowing the latter Company £80,000. He arrived at this figure some time before he knew of the £170,801. He could not say how much was relegated to Beckton and how much to each of the other works. He had visited each place for the purpose of valuing the hereditament; but not the loose plant, as that would have been an endless job. He would be very surprised to learn that the £170,801 for loose plant did not comprise anything except the tools actually in use, or being prepared for use, for the carbonization of coal. He did not allow the tenant any cash at all, as the consumers supplied the Company with £27,000, and the Company gave them 5 per cent.—not 17½ per cent.—for their money. As he understood one of Mr. Field's replies, the gas supplied during the quarter ending (say) in March was collected by the 30th of June following; therefore practically the Company needed only one quarter's expenses, and he had allowed them a great deal more—viz., 4½ months. Commencing with April, the beginning of the rating year, he had put into the tenant's pocket, to begin with, £431,000. He did not think the tenant would need this amount to begin his business; but he had given it to him. He had never awarded five-twelfths as the proper sum; and he considered that, in allowing 4½ twelfths, he had done too much. He did not allow anything for the stoves, on the ground that they were as rateable as a kitchen range or a telephone instrument.

Mr. LITTLER: From a paper put in yesterday, I see that the stock of coal on the 17th of October was 451,865 tons, and that, in a period of 19½ weeks up to the 27th of February, there would be received 708,727 tons. Does it occur to you that, if it is a fact that 708,727 tons have to be purchased, and you have in stock 451,865 tons, you yourself have provided for 1,160,592 tons which have had to be paid for?

Witness: Yes; but you would have been paid for the gas which had been made. Between Oct. 17 and Feb. 13 you would have received a large sum as payment of a quarter's rent. You start with 451,865 tons; you have been consuming that between October and February, and for the portion you have used in the quarter ending Dec. 31 you would have received, before the middle of February, money in respect of the gas. For instance, the Hackney Union Committee passed their June account on the 14th of July, and the accounts were accepted by the Board on the 22nd, on which day the cheque was signed; so that 22 days after the expiration of the quarter, a cheque was sent to the Company for £2077.

Mr. *Harry E. Jones* was recalled, at the request of Mr. LITTLER, for the purpose of explaining the item of £10,500 under the head of "retorts" at Beckton. He stated that this did not mean spare retorts, but implements and tools used by the workmen in drawing and charging. The main items were £9000 for mechanical stokers and £1500 for manual tools.

In reply to the SOLICITOR-GENERAL, witness said the item of £157,439 for stores included £18,700 for fire-bricks, which he treated as part of the tenant's capital, because they were burnt away. The £157,439 represented the total amount of stores upon the place—whether referable to the tenant or to the landlord. Similarly with regard to the loose plant, he had not made any attempt to distribute the amounts between landlord and tenant.

Mr. LITTLER said he did not propose to re-examine Mr. Jones then upon the point put to him by the Solicitor-General, as he should have to recall him on other matters at a later stage of the inquiry.

The SOLICITOR-GENERAL then proceeded to re-examine Mr. *Eve.* In regard to the suggestion that the Company had not the monopoly of the supply of light, witness said it should be remembered that the electric light involved great expense—in fact, he never heard that the electric light could be obtained as cheaply as gas. The supply of gas being a monopoly, the tenant had the right of raising the price until it had ceased to answer his purpose to do so. By raising the price, the tenant had received £211,000 more in the account year to compensate for the extra cost which had fallen upon him in other directions. This increased price had retarded development; but the output had increased. Raising the price of gas would reduce the possible dividend, under the Act of Parliament; but it would increase the actual dividend. That statement he would prove in this way: Taking the accounts for the six months ending June, 1890, they would find that the interest paid on debenture stock was £54,920; on preference stock, £107,260; and on loans, £4213—making together £166,393 for the half year. Doubling that for the year gave £332,786. Ten per cent. on the ordinary stock came to £547,062. Adding to this the £332,786 paid on debentures, preference stock, and loans, he obtained a total of £879,848. In the account year the Company took from their undivided profits £278,563; but in that period, in order to pay the 10 per cent., they would need £547,062. The amount they actually paid that year was £734,695. Deducting from this amount the £278,563 they had to take from the undivided profits, there was left £456,132; while to pay 10 per cent. they would need the sum of £547,062. Therefore it was not a question as to whether or not they would reduce the dividend which under the Act of Parliament, they might pay, by raising the price; but it was a fact that, unless they did this, they could not pay so much as they would be allowed if they increased it. The years 1887 and 1888 were prosperous ones, not lean years; but the percentage of charge for renewals was less in those years than in the account year. The charges then, according to one of Mr. Jones's tables, were less than 4d., as against the 6d. which Mr. Jones now proposed to take. His valuation of the stores, for whatever it was worth, was made after inspection on the spot. They would be much more landlord's than tenant's; the fire-bricks were, in his opinion, distinctly landlord's. The same observation applied to all other stores intended for the re-construction of the hereditament. If the £157,439 was the correct amount for stores, he was still prepared to say that, in his judgment, the £40,000 he had allowed was ample for the tenant. He would give him money in hand for 850,000 tons of coal; the quantity consumed in the account year being 1,897,479 tons. He did not think it was conceivable that a tenant going in at any part of the year would require more money than enough to buy 850,000 tons of coal. He considered that the million of money which he had allowed as tenant's capital was quite ample. He had known the Company's works before the present case.

Mr. *Field*, re-called, stated, in reply to the CHAIRMAN, that the whole of the undivided balance, pure and simple, had been used up, and that only the reserve fund remained. The latter now amounted to £232,069, which would be applicable to dividend for the current half

year. This was in addition to the £87,000 which was strictly tied up by Act of Parliament for insurance against casualties.

Mr. *W. A. Valon*, Assoc. M. Inst. C. E., President of the Incorporated Gas Institute, was then called, and, in reply to Mr. R. C. GLEN, said he had gone through the valuation of the Company's undertaking with Mr. Eve, and practically agreed with the figures given by him. He did not, however, concur with Mr. Eve in allowing £91,295 for the extra net cost of coal, as he thought too much was claimed there. He put in a tabular statement, founded upon Mr. Jones's table, comparing the cost of repairs in the Metropolitan Gas Companies from the years 1872 to 1889. He thought Mr. Jones's table did not give a proper comparison, because it was not till 1883 that the Companies were reduced by amalgamation to three, and also because the average of the existing three Companies given by that gentleman included the average of the appellant Company, which was higher than the figures for the others. The appellant Company's average from 1883 to 1889 was 4·98d. per 1000 cubic feet; but the average of the other two Companies over the same years was 3·96d.

The examination-in-chief of this witness had not concluded when the Court rose, and the further hearing of the appeal was adjourned to the 5th inst.

A New Engine for the Lewes Water Company.—The shareholders of this Company have authorized the Directors to create shares of £25 each to the amount of £5500, mainly for the purpose of meeting the cost of a new engine which they have contracted to purchase.

The Projected Sea-Front Improvements at Ramsgate.—The tendering for the new front road improvements which Mr. W. A. Valon, Assoc. M. Inst. C. E., Gas and Water Engineer of the Ramsgate Corporation, has designed for the town, as already mentioned in the JOURNAL, was of a very close character. With the exception of two tenders, which were evidently not meant for competition, they varied from £35,600 to £45,948; the average of the whole being £39,801, against the Engineer's estimate of £39,149 for this part of the work. This speaks well for the correctness of the drawings, specification, and quantities. The estimate for the total structural work was given in the first instance at £45,000, which was increased to £48,047 at the desire of the Quantity Surveyors (Messrs. Hovenden and Berridge), so as to leave a safe margin. But by the price of the accepted tender it seems that the original estimate will not be exceeded.

The Proposed Purchase of the Ilkley Gas-Works.—A meeting of owners and ratepayers was recently held at Ilkley, for the purpose of sanctioning a proposed application on the part of the Local Board to Parliament for powers to acquire the gas-works. The Chairman of the Board (Mr. Jabez Dobson) presided, and gave a history of former efforts to purchase the gas-works, and urged the importance of not only doing so now, but also of securing additional sources of water supply. He moved a resolution to the effect that consent be given to the Board taking steps to promote a Bill to empower them to purchase and acquire the undertaking of the Gas Company; to make better provision for the supply of water within the district, and for that purpose to construct works and acquire additional lands; and to obtain such other and further powers in connection with the supply of gas and water as the Board might deem necessary for the well-being and improvement of the district. On the vote being taken, the motion was passed unanimously; and a further resolution was added, requesting the Board to include in the Bill powers to supply the district with the electric light.

Death from Lead-Poisoning at Lofthouse.—For a considerable time past the inhabitants of some of the villages which derive their water supply from the Wakefield Corporation have been alarmed by the prevalence of lead-poisoning in their midst; and now a fatal case has to be recorded. On Monday, the 19th ult., a young woman named Keighley, the wife of a miner at Lofthouse, was admitted to the Leeds Infirmary; and she died at that Institution on the following Friday. The Resident Medical Officer (Mr. H. Cuff) certified that death was due to lead-poisoning; and consequently, last Tuesday an inquest was held by the Leeds Borough Coroner (Mr. J. C. Malcolm). Among the witnesses was Dr. R. Stephenson, who stated that in September last the deceased was under his care; and he then found on her gums the characteristic mark of lead-poisoning. She had suffered from epilepsy for some years; and since Sept. 9 last, she had had three distinct illnesses and recoveries. On Sept. 28 and Oct. 10 she had epileptic fits; and after the last-named date, her condition became gradually worse. From the time of the second fit, there was persistent vomiting, which was one of the symptoms of lead-poisoning, and the woman had a sallow, anaemic look, characteristic of the poisoning. In reply to the Coroner, witness averred that, during the past two years, there had not been a week without a case of lead-poisoning coming under his notice. He was sure the danger could be remedied by doing away with lead service-pipes. Mr. Cuff also gave evidence, which showed that, when the deceased first entered the Infirmary, he came to the conclusion that she was suffering from lead-poisoning. He had made a post-mortem examination; but nothing distinctive was found after death in these cases which would enable one to say that death was due to that cause. After a little discussion, it was decided to adjourn the inquest, as the general opinion of those present appeared to be that the Local Government Board should hold an inquiry; and the Coroner thought they might rely upon the Board listening to their request. Writing upon this subject, the Wakefield correspondent of the *Leeds Mercury* says: The water referred to is obtained from the Rishworth Moors, on the Penine range of hills. The water is collected by a long catch-water, and conveyed into a large reservoir at Ringstone, from which it is sent down through iron mains to the reservoir at Ardsley. The water is pure and soft when supplied from the reservoir; but many persons, despite repeated warnings, use long lengths of lead service-pipes, and, as is well known, the soft water's action on lead pipes has the effect of contaminating the pure water with lead, and this produces injurious effects. The question as to how to counteract this state of things has given rise to much discussion; and Mr. J. W. Walker, the Medical Officer to the Rural Sanitary Authority, suggested some time ago that chalk or lime should be added to the water, with a view to hardening it. This suggestion has not, however, been acted upon.

MISCELLANEOUS NEWS.

EDINBURGH AND LEITH GAS COMMISSION.

A Question as to the Lime Supply—The Cost of Coal and the Quality and Price of Gas—The Meter-Repairing Department.

The Monthly Meeting of the Edinburgh and Leith Gas Commission was held on Monday last week—Lord Provost BOYD in the chair. The Engineers' reports for the month of September showed that from both works there was a decreased output of gas, as compared with September of last year, of 3,117,000 cubic feet.

Mr. WELLS, of Leith, called attention to the lime which had been required at the two works. They found that at the one works the quantity was 83 tons; and at the other, 424 tons. In the one works the manufacture of gas was 21 million cubic feet, and in the other 63 million cubic feet, which was three times the quantity. They might expect the lime to be in the same proportion; but it was not, because it was more than 100 tons above the proportion. He had looked at past reports; and he found that in August there was an excess of 170 tons, and that in the two preceding months, there was an excess of 50 tons for each month. The Engineer was asked for an explanation with regard to this excessive quantity of lime; and he had said that, about six weeks previously, he ascertained that the lime was not doing its work, and he wrote to the contractor, who had explained that he had opened a new quarry, from which he was sending the lime, and he was sorry to find it was not up to the mark. When it was considered that complaints had been made with regard to the gas, that they had a letter from the Edinburgh Corporation about it, and that their Manager did not inform them there was anything wrong, but allowed them to write to the Town Clerk of Edinburgh, stating that the gas was pure, and that Mr. Falconer King was mistaken, he (Mr. Wells) felt he had been misled, and that he must apologize to the Corporation and to Mr. Falconer King. Mr. Mitchell must have made the discovery earlier than the time he said, because the lime was not doing its duty in June; and he did not see how any Engineer could manage works, and not discover that this was wrong, for it involved also an increase of wages. No compensation had been given by this quarrymaster; and though there had been a loss of several hundred pounds to the Commissioners, there was no mention of it in the minutes of the Works Committee. Members of the Commission might come there and go away again, and not know anything about it, unless someone was bold enough to mention it.

Bailie STEEL, the Convener of the Works Committee, said they were all obliged to Mr. Wells for bringing the matter up; but he understood Mr. Mitchell was to see that compensation was obtained for the bad lime, and that the supply of the lime was to be stopped at once. He thought they had a perfect right to claim that the money paid for the lime should be refunded. Bailie Steel went on to refer to the high price of coal, and to the extensions of the works and plant in Edinburgh, as reasons for the price of gas being so high.

Mr. WELLS said it was not coal but lime that he spoke about. If he had been discussing the quality of the gas, he would have said something very different. He had there a copy of the annual report showing the quantity of gas that was made during the year.

The LORD PROVOST: That report is before the Works Committee.

Mr. WELLS said it was; and it was being kept there, presumably till after the elections. He could speak to that report, which showed that there was an annual loss of £12,000 upon the Edinburgh works as compared with the Leith works. He was told he could not discuss the report there; he would, however, discuss it before the electors.

The LORD PROVOST said they were very much indebted to Mr. Wells for making public all the complaints that could possibly be made with regard to the management, or anything connected with the administration of the Commission. The more frankly these things were spoken of, the better would it be for the business of the Commission. There certainly seemed, on the face of it, to have been some neglect, he should say apparent, because one would think that the Manager would have found out the quality of the lime a great deal sooner than he appeared to have done. If the Manager were not there to check the quality of the lime and other materials, what was he there for? He thought it was only what they were entitled to expect that, if inferior lime were sent to the works, it should be checked, and the contractor ordered to send lime of the quality that was necessary. This did not seem to have been done, so far as they understood at present; and the consequence had been considerable outlay on the part of the Commissioners which might have been avoided. His Lordship thought this called for inquiry, and an explanation on the part of those who were entrusted with the duty of seeing that the affairs of the Commission were managed as economically and efficiently as possible; and he considered they had better remit to the Committee to investigate into the matter, and to bring up information about it at the next meeting.

Bailie STEEL said they would be all very glad to investigate the matter; but as to the annual report, it was true that Mr. Wells told them in Committee that they were not getting a sufficient quantity of gas out of the coal they were using. It was then remitted to the Engineers, specially of the Edinburgh works, to give them a report upon it. The Engineers made a report; but it was not considered satisfactory and the matter was delayed for a month to ascertain whether there could not be a satisfactory explanation. He did not think, however, that any member of the Works Committee had any such idea as the keeping of the report back till after the elections. Their only object was to get to the bottom of the matter, in order that they might be able to give a satisfactory explanation to the Commission.

The subject was then sent to the Works Committee; the LORD PROVOST remarking that the Committee was instructed to recover from the contractor what had been lost in consequence of the defective condition of the lime.

The next matter to come before the meeting had reference to an inquiry as to the cost of coal and the quality and price of gas.

Mr. WELLS said that he and others had been appointed a Sub-Committee to carry out the remit as to the present cost of gas coals in the large towns of Scotland and the north of England, the quality and price

of gas in those towns, and the causes of difference in comparison with the price of gas in Edinburgh and Leith. He did not place much importance on the first portion of the remit, because they made an inquiry into the same subject some time ago, which had been useless; but he attached much importance to the last clause, and, so far as he was concerned, the report would be a very exhaustive one. He would like to know if the Committee had power to examine the books in Edinburgh, because he thought that the difference was to be found, not by inquiring at Newcastle or Aberdeen, but by simply inquiring at the New Street works. He thought also that the Committee should have power to make application to contractors for coal and others who had not the privilege of contracting, for any information they might be willing to give. This would assist them very much. It all lay in the coal; for he had found, from a little glance he had at the works, that the Commissioners or the managership was simply rusted into a groove and set fast. He found that there had not been a change in the contractors for the last ten years. Although the contracts came before them, and the tenders were opened by them, and everything was gone about as if they were in earnest, the plain fact was that the same people had received the orders for the last ten years. The contractors could raise their price, or do what they liked; and they obtained the orders. He would like the Committee to have the power to thoroughly investigate the management of the New Street works.

The Lord Provost thought the Committee had that power already, and he did not see what additional authority the Commission could give them.

Mr. Wells then raised the subject of the meter-repairing department, regarding which the Commissioners had a report before them showing the amount expended upon it during the year, and recommending that in Edinburgh they should continue to have the repairing done on the works, but that in Leith they should send the work out as before. He said he would like to explain that it was only when the men in charge of the department in Edinburgh asked for a rise of wages that he had any idea there was such a place. It was surprising that a Commission like that, employing some 40 to 60 men, should not have a scrap of writing in the shape of a return of wages or anything else. They had visited the works, and made a comparison between the two methods, and there was not much to be found fault with; but they had not seen any books. He was not a member of the Finance Committee; and he would suggest that that Committee should have the report sent to them.

Mr. Kinloch Anderson remarked that this was one of the "hornets' nests" Mr. Wells had discovered. So far as there was any comparison between the Edinburgh and the Leith methods, it was favourable to doing the repairing on the works, as in Edinburgh. He was hoping that Bailie Steel would have taken notice of Mr. Wells's remarks about the coal contracts, whether it was the fact that year after year they had employed the same contractors, and bought the same coal. He understood that in some instances they were the same, but not in all. There was a good deal of insinuation in the whole reference made by Mr. Wells with respect to the management of the New Street works. He did not know what Mr. Wells had in his mind; but he thought it most unfortunate they should have insinuations until there was proof to substantiate them.

The report on the meter-repairing department was then sent to the Finance Committee.

The Lord Provost said he should have mentioned that there was a medical certificate before them that Mr. Mitchell was at present confined to the house by an attack of bronchitis, and was unable to attend to his duties.

Provost Aitken, of Leith, said this was the last meeting which Lord Provost Boyd would be present at; and he proposed a vote of thanks to his Lordship for his conduct in the chair.

The Lord Provost, in acknowledgment, said there was no board he had had more pleasure in attending, because there was no board where there had been more unanimity. The work had been new to a great many of them, and therefore attended with some difficulty; and he was not surprised that circumstances should occur, such as they had had before them that day, which needed investigation and clearing up. He quite anticipated that some little time would elapse before they got all the departments of the Commission into such thorough training and management as would be satisfactory to themselves and to the community; but that time would come. He was quite sure the Commissioners would conscientiously do their duty; and he was only sorry he would not be there to see all those improvements come about, but he felt satisfied the interests of the town were in good hands.

LEEDS CORPORATION GAS UNDERTAKING.

The Progress of the Works.

In view of the coming municipal elections, the *Leeds Mercury*—the leading local Liberal paper—published an article last Thursday headed "Liberal Administration in Leeds," in which the writer examined certain charges that are being levelled at the Liberal majority of the Council by their Conservative opponents—viz., that they have allowed surplus lands and buildings to accumulate to the extent of "hundreds of thousands of pounds," on which no return, or no adequate return, is made. Following this examination, the writer gives short interesting accounts of the progress which some of the undertakings of the Corporation have made under their government. The following is the portion of the article referring to the gas-works:—

The gas-works have been under the management of a Committee of the Corporation for a period of 21 years; and the results accomplished show that the business has been conducted with efficiency and economy. The works have been extended as occasion required to meet the necessities of the constantly increasing population; improved appliances for the manufacture of gas have been introduced; the illuminating power of the gas has been increased, while its cost has been decreased; and the employees work shorter hours, and are better paid than in former years. Through the courtesy of the Chairman of the Committee (Alderman Gilston), the following statistics have been supplied, showing the progress of the undertaking. In 1870 the Corporation purchased the whole of the gas-works owned by the Leeds Gaslight Company and the Leeds New Gas Company for the sum of £763,224 10s. 4d. Since that time they have expended £156,186 16s. on the extension of the works, £115,127 11s. 9d. on the extension of the gas-mains, £38,044 19s. 1d. on gas-meters, £69,842 14s. 10d. on gas-holders, and £4624 on gas-stoves—making a total of £1,147,050 12s. From this amount has to be deducted £16,613 18s. 3d. received from the sale of the Boar Lane estate; leaving the sum of £1,130,436 13s. 9d. as the total expenditure upon capital account. The cost of capital expended per ton of coal carbonized up to 1871 was £7 16s. 8d.; up to 1881, £6 6s. 11d.; and up to 1891, £4 15s. 4d. The progress and development of the works may be seen from the following figures:—

	Coals Used. Tons.	Gas Produced. Cubic Feet.	Gas Made per Ton. Cubic Feet.
1871	98,878	888,116,000	9,025
1881	150,820	1,456,696,000	9,658
1891	240,587	2,411,931,900	10,029

	Gas Sold. Cubic Feet.	Gas Sold per Ton. Cubic Feet.
1871	688,169,000	6,960
1881	1,287,144,000	8,534
1891	2,102,319,500	8,738

	Number of Meters in Use.	Gas Sold per Meter. Cubic Feet.
1871	58,700	11,723
1881	67,400	19,097
1891	82,500	25,482

In 1871 the cost of the coal used was 9s. 1¼d. per ton; in 1881, it was 7s. 7d. per ton; and in 1891, it was 12s. 0½d. per ton. The total number of men employed in 1881 was 795, at wages varying from 3s. 4d. to 4s. 10d. per day of twelve hours. In 1890 the total number of men employed was 1436, at wages varying from 3s. 8d. to 5s. per day; those employed in the retort-house working a day of eight hours. Each man is entitled to four days' holiday per annum, for which there is no deduction from his pay; and if required to work during those days, he is paid double time. The wages paid for carbonization in 1871 were 2s. 8¾d. per ton of coal used; in 1881, 2s. 11¼d. per ton of coal used; and in 1891, 3s. 10d. per ton of coal used. The total number of men employed on the works, exclusive of street men, is at present 1259, at wages varying from 3s. 8d. to 5s. per day. The income from the gas-works in the years named was as follows:—

	Gas.	Coke.	Tar.	Ammoniacal Liquor.	Gas-Stove Rents.
1871	£116,818	£8,487	£6,316	£3,029	—
1881	126,336	11,819	19,704	17,976	—
1891	231,328	33,254	16,726	19,433	£630

The price of gas has been reduced from 3s. 6d. per 1000 cubic feet in 1871, with discounts to all consumers above £5 of 2½ to 20 per cent., to 2s. 2d. per 1000 cubic feet in 1891, less 5 per cent. to all consumers, however much or little they consume; the net price being 2s. 0½d. per 1000 cubic feet. The total profits from 1871 to 1891 have been £124,589 11s. 1d.; and the total loss incurred during the same period has been £76,793 17s. 8d. The profits have from time to time been transferred to the borough fund account, or to the depreciation and reserve fund account; the latter having been expended in the improvement of plant. The sinking fund set aside from the revenue was in 1881, £87,000; and in 1891, £200,300, which is equal to nearly one-fifth of the total amount expended on the works. There are employed in the distribution department as pipelayers, &c., 110 men, whose wages range from 3s. 4d. to 5s. per day; meter repairers, 33 men, whose wages vary from 3s. 6d. to 6s. 4d. per day; and plumbers and labourers, 41 men, with wages from 3s. 6d. to 6s. 4d. per day. These men have the same privileges as to holidays as the others already mentioned. The number of meters repaired in the five years ending 1881, was 19,174, at a cost of £5079, or 5s. 3d. per meter; the number in the five years ending 1886, was 17,268, at a cost of £4232, or 4s. 11½d. per meter; and the number in the five years ending 1891, was 25,173, at a cost of £9500, or 5s. 5d. per meter. The illuminating power in 1881 was 16·64 candles per 15-hole burner; while in the present year, it is 19·07 candles per 24-hole burner. The sulphur impurity in 1881 was 25·96 grains per 100 feet; and in 1891 it has been reduced to 16·36 grains per 100 feet, as reported by the Borough Analyst. With respect to the distribution of the gas, it may be mentioned that in 1871 the gasholder capacity was about 5½ million cubic feet, which has been increased to 10½ millions; the increased gasholder capacity having been accomplished by the conversion of the gasholders from two lifts to three lifts, mainly out of the depreciation and reserve fund previously referred to, with the exception of the last one constructed at Kirkstall Road, which contains 2¼ million cubic feet, and which was erected at the cost of capital. The supply is regulated by ten governors, distributed in various parts of the town; and there are at work six gas-engines and one steam-engine for exhausting the gas from the different works to the holders at the outlying storeage stations. Throughout the borough there are between 700 and 800 miles of gas-mains, ranging in size from 30 inches diameter to 1¼ inches, and covering a lighting area of 13 square miles. During the last twelve years, 9 miles of new mains have been laid, and 63 miles of old mains have been relaid, giving an average of about 6 miles of new mains laid each year.

Gas and Electric Lighting at Sheffield.—At last Wednesday's meeting of the Sheffield Town Council, a Committee was appointed to consider the best means of obtaining a more thorough and satisfactory system of testing the gas supply of the borough. The minutes of the Parliamentary Committee which were submitted for adoption at the same meeting recommended the Council to assent to the application of the Sheffield Telephone Exchange and Electric Light Company for powers to supply electricity. There was a good deal of opposition to this proposal; but ultimately it was agreed to.

THE PROPOSED NEW GAS-WORKS FOR STOKE.

In the JOURNAL last week, a paragraph appeared referring to the projected new gas-works for Stoke-on-Trent; and a few particulars were given showing that, owing to the increasing consumption of gas, it was absolutely necessary that the Corporation Gas Committee should at once spend some additional capital in this direction. It appears from further information which has been received, that the Committee have found difficulty in securing the requisite gasholder capacity to meet the growing demand; and so serious is the position of affairs, that they have already come to the decision that the only way out of a somewhat embarrassing situation is to erect entirely new works. An additional gasholder, they point out, is an immediate necessity, the simple erection of which, however, will not effect any economies, but rather embarrass the Committee by having to provide interest and a sinking fund on the capital outlay, without being able to reduce the expenditure. In addition, a large amount of money would have to be spent upon the present works. If, on the other hand, the Committee were empowered to spend additional capital on new works over and above what would be required for a new holder and partly rebuilding the present works, the economies effected would meet the interest and sinking fund on the new capital. These economies could be effected, if the new works were placed on the side of a railway, by a reduction of 1s. per ton in the price of coal; thus saving £500 per annum. Other savings, it is said, could also be realized in the retort-house, and larger boilers fixed, which would be worked at much less cost. The ammoniacal liquor would also be worked up; and these, with various other economies, would effect a further saving of another £500 per annum. The Committee state that the rapid increase in consumption is placing them in a decidedly worse position than at the time when the works were transferred from the Company to the joint towns of Stoke and Fenton in the year 1878. In that year the make of gas for the two towns was 83,322,000 cubic feet; while last year the make for Stoke alone was 95,195,000 cubic feet. It was considered necessary even some years prior to 1878, when the make of gas was comparatively small, to have gasholder capacity to the extent of 460,000 cubic feet. At the time of the separation between Stoke and Fenton, in 1883, one of the three gasholders, of the capacity of 110,000 cubic feet, was apportioned to Fenton; and this reduced the storeage of Stoke to the present amount—viz., 350,000 cubic feet only, whilst the daily delivery last winter rose to 539,000 cubic feet. If the storeage was compared with Stafford, Longton, and Fenton, it would be found that Stoke had considerably less than those towns. The two first-mentioned towns were on about the level of Stoke for consumption; whilst the consumption at Fenton is only about one-half that at Stoke. The following gives the make of gas, and the storeage, for the different towns for the year ending March, 1891: Stoke-on-Trent, 95,195,000 cubic feet, with storeage for 350,000 feet; Longton, 94,500,000 feet, with storeage for 850,000 feet; Stafford, 102,875,000 feet, with storeage for 780,000 feet; Fenton (two holders), 46,262,000 feet, with storeage for 470,000 feet. Since the works were transferred from the Gas Company, Stoke has profited (principally in the relief of rates, but including reserve fund and reduction of capital), to the amount of £42,942 4s. 2d. Meter-rents were abolished in 1882; and in 1885 the price of gas was reduced from 3s. 6d. to 3s. per 1000 cubic feet. This represents a reduction of revenue (taking last year's consumption) of £2700 per annum; but the Committee notwithstanding, continued to pay £2500 per annum, and sometimes more, towards the relief of the rates, even in the face of the very large advance in the price of coal. In 1888 the Committee applied for a Provisional Order with regard to the repayment of loans; and, after persistent and determined effort, the Order was granted on May 31, 1888, the result being a considerable monetary saving. An examination of the statistics of the department will, the Committee contend, show that the concern has since its transfer been successfully worked, and made most satisfactory progress. The unaccounted-for gas, they point out, has under the present management been most decisively reduced. In the year ending 1881, it totalled to 16,016,300 cubic feet, or 15·89 per cent. of the whole manufacture. It has gradually been reduced, until this year it has reached the low figure of 6,736,000 feet, or 7·04 per cent. of the manufacture, representing an annual saving of about 1000 tons of coal.

A Special Meeting of the Town Council was held yesterday week—Alderman W. BOULTON presiding—for the purpose of considering the proposed extension of the gas-works.

Alderman LEASON, the Chairman of the Gas Committee, gave a history of the gas undertaking from the time of its purchase in 1878 by the joint authorities of Stoke and Fenton, and its subsequent acquisition by the Stoke Corporation in 1882; and then he proceeded to say that the make of gas for the year ended March last was upwards of 95 million cubic feet, and the daily delivery last winter rose to 539,000 cubic feet, while the storeage capacity was only 350,000 cubic feet. The Manager (Mr. Herman Taplay) had from time to time reported upon the inability of the present plant to properly purify the gas; and consumers had frequently complained of its impurity and insufficient illuminating power. The Gas Committee were fully alive to the necessity for improving the quality of the gas. But with the increasing consumption, they knew that the limit of their producing power would soon be reached; and therefore they considered that any large expenditure upon the present works would be money thrown away. If the Committee could have obtained a convenient site near the existing gas-works, they would have proposed the erection of an additional holder; but there was not sufficient accommodation, and therefore they would have to go elsewhere if they must construct a new holder. This would cost at least £12,000, which would not effect any economies, but remain unproductive, while entailing upon the Committee the cost of interest and a sinking fund on the capital outlay. In addition, a large sum would have to be spent on the old works. In view of these facts, the Committee considered that, if the Council built new works upon a suitable site, requiring very little expenditure over and above what would be required for a new holder and partly rebuilding the present works; economies might be effected which would meet the interest and sinking fund on the new capital. The Committee had considered the question of electric lighting; and as they found that, while the cost of producing gas was 1s. 10d. per 1000 cubic feet, the cost of producing the same lighting power by electricity would be 3s. 9d., with a capital outlay of some £30,000 for new works and plant, they had decided to leave electricity alone until it had been further developed, and to come to the Council to ask for power to erect new gas-works, which would enable them to meet the future requirements of the borough. In this decision they were supported by the opinion of Mr. Corbet Woodall, C.E. As it would be necessary to go to Parliament for authority to do all this, it was thought advisable to take the opportunity of seeking other powers in the Bill to improve the general position of the town. He therefore moved a resolution to the effect that it was expedient for the Council to promote, in the next session of Parliament, a Bill to empower them to make and maintain gas-works, to acquire additional lands, to manufacture and store gas and residual products thereon, to make other provisions with regard to the gas undertaking and the revenue and profits arising therefrom, and, among other things, to extend and alter the boundaries of the borough.

Mr. BENNETT seconded the motion.

Mr. GEEN moved as an amendment—"That, in the judgment of the Council, the time has not arrived for the promotion of such a Bill as the one proposed in the resolution." He contended, and gave statistics to show, that the present works were equal to supply the prospective increased demand for at least two or three years to come. With regard to electricity, he said there were so many electric companies willing to enter towns and compete with gas companies that it was only fair to assume that the charges for electric lighting would be favourable to the consumers. He believed it would be the light of the future, and that the Council would do well to wait the results of experiments elsewhere.

Mr. ROBINSON, in seconding the amendment, complained that the Council were entirely without plans, estimates, or details of any kind; and he contended that the figures submitted were guess-work.

Other members having spoken, Alderman LEASON admitted that they had two or three years in hand with regard to the manufacturing capacity of the present works, but said it would take that time to erect the new works. He appealed to the opponents of the scheme to allow it to go before the ratepayers, so that their opinion might be taken upon it. The amendment was rejected by eleven votes to six, and the resolution was then carried by eleven votes to six; but the Town Clerk explained that, as the law required it to be carried by a clear majority of the Council, it was practically lost.

PENRITH GAS SUPPLY.

Additional Storeage and Scrubbing Plant for the Gas-Works.

The need for additional storeage and scrubbing plant at the Penrith Gas-Works has lately been forcing itself upon the attention of the Gas Committee of the Board of Health; and a short time ago they consulted Mr. J. Hepworth, M. Inst. C. E., the Gas and Water Engineer of the Carlisle Corporation, on the matter. Mr. Hepworth inspected the works, and reported generally thereon. His report was considered by the Committee, with the result that they decided to recommend the Board to have a new gasholder of a capacity of 200,000 cubic feet, and additional scrubbing plant, and to give the necessary instructions to the Town Clerk to apply to the Local Government Board for sanction to borrow £4000 for the purpose. These recommendations came before the Local Board in the minutes presented by the Gas Committee at the usual fortnightly meeting on the 24th ult., when the Chairman (Mr. Sweeten) made a few explanatory remarks in moving their adoption. He stated that the present gasholder was in use some time before the works were taken over by the Board. It was then of sufficient capacity for their requirements; but the consumption of gas was only 12 million cubic feet per annum. It had since gone up by leaps and bounds; and this year it would be more than 30 millions. The scrubber was also ample for former requirements; but it was very unsuitable now for the quantity of gas sent through it, and was quite inadequate to deal with it. One or two other things were suggested by Mr. Hepworth; but the Committee felt that the necessity for another holder and an additional scrubber was so great, that they agreed to defer the consideration of the other matters, and concentrate their efforts upon these two. Mr. Hepworth stated in his report that the consumption of gas in Penrith had increased during the past five years as follows: In 1886 the total make was 23,500,000 cubic feet; in 1887, it was 24,200,000 cubic feet; in 1888, 25,348,000 cubic feet; in 1889, 26,841,000 cubic feet; and in 1890, 29,000,000 cubic feet. This rate of increase was, he considered, extremely satisfactory, and ought not to be difficult to maintain. Any extension of the works, therefore, should be made in view of some such increase over a period of years. The present storeage capacity at the works was about 100,000 cubic feet; and the maximum daily consumption of gas 164,000 cubic feet. The Board would therefore see that they had not storeage for a day's consumption of gas—in fact, he (Mr. Sweeten) believed the consumption on some days this year amounted to double the storeage. Mr. Hepworth pointed out that it was not safe to have less storeage room than the amount of the daily consumption. The site available would allow of the erection of a holder about 78 feet in diameter, which could be either single-lift or telescopic. In the former case, it would contain about 100,000, cubic feet and in the latter case 200,000 feet. Mr. Hepworth recommended the telescopic system of construction; and the Committee had decided to adopt it. With regard to the scrubber, this was a work of necessity. The quantity of ammoniacal liquor they made at the gas-works averaged only 11 gallons per ton; whereas it should be 30 gallons. They were thus losing two-thirds of what they ought to make, owing entirely to the inadequacy of the scrubber. The only question about which any dispute could arise was whether they should erect a two-lift holder or be content with a single-lift one. The Committee thought they should erect a two-lift, because in the immediate future 200,000 cubic feet would only represent one day's consumption of gas; and as the life of a holder was between 25 and 30 years, and the present one had been in use nearly 30 years, if anything happened to it, they would only have a day's supply. He therefore had no hesitation in asking the Board to sanction the Committee's recommendation. The motion was carried unanimously.

BRISTOL GAS COMPANY.

The Conversion of the Stock.

An Extraordinary Meeting of this Company was held last Wednesday—Mr. J. W. S. Dix presiding—for the purpose of passing resolutions with regard to the conversion of the stock of the Company.

The Secretary (Mr. Jas. V. Green) having read the notice convening the meeting,

The Chairman said that he would not take up much of the time of the shareholders. They knew that an Act of Parliament had been passed relating to the Company's stock; and they were met to take the necessary steps to divide it. He moved—"That, in pursuance of the provisions of the Bristol Gas Act, 1891, the present authorized capital of the Company, £511,250, entitled to a maximum dividend of 10 per cent. be converted into a capital of £1,022,500, with a maximum dividend of 5 per cent." He need not explain to the shareholders anything more. They knew all that had taken place, both when the Bill was before Parliament and since it had been passed.

Mr. R. D. Robjent seconded the motion.

Mr. Allis asked if the divided stock would stand on an equal footing. There was an impression abroad that half of it would be preference stock.

The Chairman said there was no preference or deferred stock. If a person had £100 now carrying 10 per cent., he would in future have £200 carrying 5 per cent. He believed the public would appreciate the division of the stock.

The resolution was carried.

The Chairman next moved—"That the unissued portion of the general capital stock of the Company be created and issued by public auction, in manner prescribed by the Bristol Gas Act, 1891, in such amounts and at such times as may be considered desirable by the Directors."

Mr. Robjent seconded the resolution, which was adopted.

The Chairman next proposed—"That the unissued portion of the debenture stock of the Company be created and issued by public auction, in manner prescribed by the Bristol Gas Act, 1891, in such amounts and at such times as may from time to time seem desirable to the Directors."

Mr. Richards seconded the motion, and it was agreed to.

The Chairman then moved—"That the Directors of the Company be empowered to take all such steps as they may deem necessary or advisable for carrying out and giving effect to the foregoing resolutions."

Mr. White seconded the motion, and it was adopted.

The Chairman announced that the division of the stock would be at once proceeded with.

The meeting then terminated.

CEARA GAS COMPANY, LIMITED.

The Annual General Meeting of this Company was held last Friday at the London Offices, 9, Queen Street Place, E.C.—Mr. Horatio Brothers in the chair.

The Secretary (Mr. T. Guyatt) read the notice convening the meeting; and the Directors' report and the statement of accounts (which were referred to in the Journal last week, p. 766) were taken as read.

The Chairman said that, before formally moving the adoption of the report and accounts, he wished to make a few remarks upon them. The accounts, he thought the shareholders would agree, were on the whole satisfactory, especially with regard to those items over which any control could be exercised. The receipts for gas showed the favourable increase of £745 in the private lighting, and of £350 in the public lighting; or, taken together, an increase of more than 7 per cent. The receipts for residuals were about the same; but the increase in the profit on fittings was £117 more. The cost of the coal and cannel carbonized in 1891 was £418 more than in 1890; an additional 129 tons having been used. The make of gas per ton of coal carbonized, and the cost per ton, were pretty much the same in both years. In 1891, the make per ton was 10,528 cubic feet; and the cost £2 3s. 8d. per ton. The cost of manufacture—as there were 1,400,000 cubic feet more gas made at a decreased cost of £15—showed that in this department a marked improvement had taken place. The item of repairs and maintenance had increased in the year by £554. This showed that the plant had been kept in good order and repair; and it was a very legitimate expenditure. The general charges had come down to their normal state in 1891; there having been a decrease of £333 as compared with 1890, when exceptional expenses were incurred. The item of exchange stood at £1364 in 1891; being 3¼ per cent. on the capital of the Company, and £614 more than in 1890. In this matter the Company were the victims of circumstances over which they could exercise no control. The tax on meters, he was glad to say, had disappeared in the present accounts. Notwithstanding the exceptional and heavy increases as previously mentioned, the profit for the year was £4072, as against £3985 in 1890, which, he thought the shareholders would agree, was a very satisfactory result, and reflected credit on the management at Ceará. The shareholders would see from the balance-sheet that the whole of the capital of £40,000 had been spent on the works and plant, and that consequently the Company were without working capital, except that they were enabled to use the reserve fund. They were crippled and put to extra expense for want of sufficient capital; and as the demand for gas was growing, and fresh outlay was constantly required, the Directors proposed to issue debentures to the extent of £5000 in the next six months. It was proposed to pay 6 per cent. interest on them; and he hoped the shareholders would avail themselves of such a good and undoubted security, which was not easily procurable in the present state of the money market. He found that the expenditure on capital since June 30, 1874, had been £15,234; but out of that sum £5339 had been written off as depreciation. They deducted 1 per cent. per annum from the capital expenditure; and so they had left £9895 as the net increase of the investment. In addition to this sum, £4600 of debentures had been paid off. Their Company was the only one that he knew of—especially a Brazilian Company—which took the precaution of writing off 1 per cent. for depreciation. Under these circumstances, he thought they might congratulate themselves upon the favourable position of the concern; and he looked forward to the future for increased prosperity. The demand for gas was growing, particularly the private consumption, and they could not continue to carry on the business efficiently unless the shareholders provided the necessary funds. He then moved—"That the report and accounts be received and adopted."

Mr. A. J. King seconded the motion, which was unanimously agreed to.

The Chairman next moved a resolution adding £500 to the reserve fund (making it £4500), and declaring a dividend for the six months ending June last of 5 per cent. on both the preference and ordinary shares, making, with the interim dividend, 10 per cent. on the former and 9 per cent. on the latter for the year.

Mr. F. A. Wallwroth seconded the resolution, which was carried.

On the proposition of Mr. King, seconded by Mr. Magnus Ohren, the Chairman and Mr. Wallwroth, who retired by rotation, were re-elected to their seats at the Board.

Mr. Magnus Ohren was then appointed Auditor, in place of the late Mr. Robert King.

A vote of thanks was passed to the Secretary (Mr. T. Guyatt), the Engineer (Mr. T. M'Making), and the staff, on the proposition of the Chairman, seconded by Mr. J. Darell Blount; and a similar compliment was paid to the Directors, on the motion of Mr. W. C. Parkinson, seconded by Mr. Magnus Ohren.

The proceedings then terminated.

LIVERPOOL CORPORATION WATER SUPPLY.

The Contract for the Mersey Tunnel.

At the Meeting of the Liverpool City Council last Wednesday, the Water Committee recommended that the existing contract with Messrs. John Cochrane and Sons for the execution of work in connection with the tunnel under the Mersey at Fidler's Ferry be terminated, and that a new arrangement be entered into with Mr. H. H. Cochrane and Mr. A. H. Cochrane to continue the work. Alderman Hughes, in moving the adoption of the recommendation, referred to the reports which had been presented on this subject by Sir B. Baker, Mr. Deacon, and himself and the Deputy-Chairman, and said they were advised, having regard to the opinions of Sir B. Baker, that it would be very disastrous for the Corporation to abandon the present works. The Town Clerk had received information that the shield, altered as suggested by Sir B. Baker, would be ready within a week or ten days, when the work would be continued. The Engineer was still sanguine that the tunnel could be carried out without trenching beyond the £8885 balance payable to the contractors (Messrs. Cochrane and Sons), supposing they had completed their original contract, the price of which was £12,000; but, of course, it was impossible for anybody to give a positive guarantee. The Vyrnwy works would be finished within a reasonable time. He could not give them a guarantee as to the completion of the work; but from the expression of opinion which he had been able to get from the Engineers, he understood that they would be able to complete the work by June or July. If the contractors had made a mistake by not having had experience with regard to constructing a tunnel, still there was no reason why the work should not be completed in a thoroughly satisfactory manner. The Committee felt that they were perfectly right in recommending the Council to adopt the suggestions. Sir B. Baker had declined to enter unconditionally into the subject of this contract; but he had assured them that the work could be carried out, and that there had been no negligence on the part of Mr. Deacon. Still it was necessary for them to have certain advice as to the probability of bringing these works to a satisfactory completion; and this advice confirmed them in their action. Mr. A. H. Holme seconded the motion. Alderman Forwood said he believed that, had Mr. Hawksley had his way, he would have taken the tunnel down to the rock. It would have been a great expense, still it would have been more successful, and less costly than the scheme already adopted, and which was involving the city in a great outlay. Mr. Duncan supported the Committee in their action; and his remarks were endorsed by Mr. Whitley and others. The motion was adopted.

The New Water Scheme for Bradford.—The Bradford Town Council last Tuesday passed resolutions, authorizing steps to be taken to promote a Bill in Parliament in the ensuing session for an Act to construct and maintain new works in connection with the scheme of water supply from the Nidd Valley, and the relinquishment of portions of the works sanctioned by the Act of 1890. On the following day, at a public meeting of ratepayers, authority was given to the Council to make the application for power to modify the scheme.

The Gas Question at Eccles.—At a meeting of ratepayers in the district of the Eccles Local Board, held last Thursday, two resolutions were passed—one expressing indignation at the action of the Chairman of the Local Board in not complying with the wish of a deputation that presented, on the 19th ult., a petition signed by 199 ratepayers and property-owners, asking that a ratepayers' meeting should be called to consider the gas question; and the other, protesting against the "hasty and ill-considered" action of the Board in committing their successors, the Town Council, to an extensive scheme which they themselves would have no opportunity of carrying out.

A Water-Supply Scheme for Conway.—Last Thursday the Joint Committee appointed to consider the question of obtaining a supply of water for Colwyn Bay and the districts of the Conway Urban and Conway Rural Sanitary Authorities opened the tenders for the carrying out of a scheme, propounded by Mr. T. B. Farrington, for the supply of water from Llyn Cowlid; and they decided to accept the tender of Mr. T. Bugbird, of Carnarvon, amounting to £21,050. The work involves the laying of 14 miles of 12-inch piping. Mr. James Mansergh was appointed Consulting Engineer; and the Committee decided to apply for a loan of £30,000.

THE CORPORATION OF LONDON AND THE WATER QUESTION.

The County Purposes Committee of the Corporation of London have prepared a report on their proceedings under certain references to them in relation to the water supply of the Metropolis. It takes up the subject from the 21st of October last year, when the report the Committee had presented to the Common Council on the question, and particularly on the public inquiry held thereon, under the auspices of the Corporation, during the preceding summer, was sent back to them to be carried into execution. That report, our readers will probably remember, placed the whole matter upon a definite basis, and laid down the lines upon which, in the opinion of the Committee, a Bill should be presented to Parliament. One was accordingly prepared, and duly deposited. In the course of time, it came before the Select Committee appointed to deal with the Bill promoted with a similar object by the Vestries and other Local Authorities of the Metropolis, as well as with the other measures bearing upon water supply; but, in the result, it was rejected. During the sittings of the Select Committee, a conference took place between the County Purposes Committee of the Corporation and the Water Committee of the London County Council, when certain propositions for combined action between these bodies were discussed, and the bases of operations submitted to the Select Committee. It will be in the recollection of our readers that these proposals were not entertained; and the Committee eventually decided not to pass any Bill, but to make a special report to the House. This report contained the now well-known six recommendations, upon which, and upon the general question, the County Purposes Committee make the following remarks:—

The effect of the Select Committee's recommendation, if adopted, would be to delay any solution of the Metropolitan Water Question by effective legislation until the next quinquennial valuation in 1896, even if any could be passed so soon. That this is not an exaggerated suggestion will be seen from the following probable course of procedure: An Act giving the London County Council authority to inquire may be passed in 1892; their inquiry and decision in 1893; their report to Parliament in 1894; possibly followed by proceedings in Parliament to authorize a parliamentary inquiry in 1895; after which a basis for legislation may possibly be arrived at in 1896. But seeing that the powerful opposition of the Water Companies at every stage has to be reckoned with, it is more than probable that the investigations and procedure, even if there should be no independent inquiry by Parliament, would occupy a longer time than the above sequence of years suggests.

Your Committee cannot but regret that the Select Committee did not arrive at the conclusions set out in their report before they rejected the Corporation Bill, as that Bill provided, among other things, for immediately and efficiently carrying out every necessary inquiry, instead of remitting the question to an uncertain future. It is, however, a matter for satisfaction to your Committee to notice that the proposed joint action of the Corporation and the London County Council met with as much favour at the hands of the Select Committee as it has with the bodies themselves, and the very large public whom they represent. The very grave importance of the subject itself, affecting as it does the daily wants of so large a concentrated population, and the difficulties attending the financial aspect of an operation involving so many millions of money, necessarily suggest the greatest caution and deliberation. But your Committee, in recommending the further steps to deal with the question, venture to state that the experience and inquiries of the last twenty years have plainly indicated the path that should be pursued.

The Select Committee, before the proceedings commenced, decided not to go behind the recommendation of the Committee of 1880: "That it is expedient that the supply of water to the Metropolis should be under the control of some public body which shall represent the interest and command the confidence of the water consumers;" which decision is in accord with all modern legislation on the subject. If, then, the supply of water to the Metropolis is to be transferred from private enterprise to municipal control, what course is to be adopted? In all the larger towns in the United Kingdom, it has been the purchase of the existing supply, and, when that has proved inadequate, the addition of a supplemental supply. This course has received the unvarying sanction of Parliament; and your Committee know of no case in which a public body has acquired what was a private supply in any other manner. Every purchase implies a vendor, a purchaser, a subject of sale, and a price paid. In the case of purchasing even a single small water undertaking, each one of these elementary heads gives rise to many difficulties and many differences of view. In the event of a purchase of the eight Metropolitan Companies, the difficulties must be innumerable, and the differences of view extremely wide. But difficulties and differences of very great magnitude must continue, no matter how many inquiries take place; and with the lapse of every twelve months, they must, and will, enormously increase. While, therefore, on the one hand they are by no means to be ignored, or rashly dealt with, they ought not, on the other, to be too readily acknowledged as insurmountable.

As your Honourable Court is aware, a Bill was introduced in 1880, by the then Home Secretary, for the purchase of the eight Water Companies, on terms which had been provisionally settled between Mr. E. J. Smith, on behalf of the Government, and each of the Companies. The financial proposals of the Bill embraced a scheme for the issue of water stock to the share and debenture holders of the Companies on certain terms; and it was proposed to create a Water Trust to represent the interests of the consumers and the public generally. This Bill was defeated, on the ground that the price proposed to be paid was too high for the undertakings the Companies had to sell; and in the proceedings before the Select Committee to whom it was referred, and in that Committee's special report, the basis on which any price for the purchase of the undertaking should be fixed was very fully discussed. The same points were raised last session, and always will be raised by vendor and purchaser when the attempt is made to fix a price. Your Committee have most anxiously considered how and by whom a decision is to be come to on the question of what is, and what is not, a fair price for a London water undertaking. Although the final decision to accept or reject any conclusion that may be arrived at must eventually rest with Parliament, the investigation of all the details can hardly be conducted within its walls; and some other tribunal is necessary to which vendor and purchaser can each appeal with confidence.

Your Honourable Court is aware that, outside of the ordinary Law Courts, Parliament has from time to time sanctioned and created different tribunals and modes of procedure for the purpose of deciding important issues as and when they arise; perhaps the best known of them being the procedure under the Lands Clauses Acts. These Acts were originally passed to meet the requirements of compulsory purchase of lands for the purposes of canals, railways, and similar undertakings, but have since been very widely adopted, with or without special modifications; and your Committee are of opinion that upon these Acts may be founded a satisfactory tribunal to investigate and determine the points at issue between the Companies as vendors, on the one hand, and the purchasers on the other. If your Honourable Court should be of this opinion, it remains to be considered what steps should be taken to bring the issue before such a tribunal, and obtain a final decision upon the question of price. Your Committee see no reason why the Joint Committee should not be immediately constituted; and, when so constituted, they might, under the principle of the Lands Clauses Acts, serve notices to treat on the Companies, and so initiate and conduct proceedings.

Your Committee are fully aware that in this report many important points are not dealt with; but they have endeavoured to keep constantly before them the necessity of arriving without delay at some definite practicable solution, as continued delay not only increases the inherent difficulties of the great problem referred to them, but very largely increases the price that will ultimately have to be paid. They therefore now recommend that the necessary steps be taken to introduce a Bill next session for the following purposes: To give statutory powers to the Joint Committee of the Corporation and the London County Council; to authorize that Committee to give notices to treat to the Metropolitan Water Companies within four years, and to make the giving of such notices obligatory at the expiry of that period; to constitute a tribunal to ascertain the price to be paid, and to clothe such tribunal with the fullest powers of inquiring into, and deciding upon, all such questions as it may consider necessary with a view to purchase; to enable such tribunal to decide as to the purchase by Local Authorities outside London of the works of distribution within their district, and also as to the supply of water in bulk to such outside authorities (as recommended by the Select Committee); and to pay for the undertakings by stock having the ultimate security of the county rate.

In submitting these recommendations, your Committee desire to point out that, if the principle of them be adopted by your Honourable Court, it will be necessary to pursue them without loss of time, and in considerable detail; for which purpose they ask that the necessary reference back to them be made.

The report above referred to was brought up by Mr. Rose-Innes, the Chairman of the County Purposes Committee, at the meeting of the Court of Common Council last Thursday. It gave rise to a long and animated debate, in the course of which there were four divisions, either for the adjournment of the Court or of the discussion. Eventually, it was decided to hold a special meeting on Monday (yesterday) to further consider the matter. The result was the rejection of the report, and the adoption of another recommending the Corporation to join the Council, and re-introduce the agreed Bill of last session.

Hartlepool Gas and Water Company.—At an extraordinary meeting of the shareholders of the Hartlepool Gas and Water Company last Thursday, it was decided to issue 4601 new shares of £10 each, and that 2061 of these (water capital) should be allotted to the present shareholders, and the remainder (gas) offered by auction.

The New Water-Works for Wakefield.—Last Thursday a special meeting of the Wakefield City Council was held, in order to deal with certain matters in connection with the extension of the new waterworks. Alderman Carter, the acting Chairman of the Water Committee, proposed a resolution to the effect that the common seal of the Corporation should be affixed to an agreement proposed to be entered into between Lord Savile and the trustees of the Savile estate and the Corporation, for the purchase of certain land and easements required for the purposes of the water-works at Rishworth Moors, where it is now proposed to construct the Green Withens reservoir. In doing this, he said that, as the members of the Corporation were aware, it had taken some considerable time to get as far as they were at present with the arrangements. Under the agreement, the Corporation had purchased 129 acres of land; and for the land, easements, and all other arrangements, the Corporation had to pay £3075. He hoped now they had got to this stage, it would not be long before the contracts for the works were let and in progress. The motion was seconded and carried unanimously.

Threatened Strike of Gas Stokers at Bradford.—A special meeting of the Bradford branch of the Gas Workers' Union was held last Tuesday evening, for the purpose of considering what action should be taken in reference to the introduction of the machine stoker at the Corporation gas-works, and the enforced reduction by the Manager of 6d. per shift in wages. The men state that they do not complain so much of the introduction of the machine as of the reduction in the wages of those who have to work with it. They contend that the wages paid in Bradford are less than those paid for the same class of work in such towns as Salford, Manchester, and Birmingham. They further complain of unfair treatment by the Gas Committee, inasmuch as that body has not given any satisfactory reason for not complying with their petition as to wages, &c. The situation was discussed at considerable length on Tuesday, and ultimately the following resolution was unanimously agreed to: "That we, as a body, protest against the action of the Gas Committee in reducing the wages 6d. per shift in consequence of the introduction of the so-called machine stoker, and that we send in our notices to cease work fourteen days after the receipt of this notice by the Gas Committee."

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

So far as these Notes are concerned this week, Mr. Wells, of Leith, is the "hero of the hour." Whether he be a genuine hero, or only a gesticulating figure administering impotent blows with the broadside of a wooden sword, time only can tell. Until the Committee of which he is a member, and which, it must be remembered, was appointed for another purpose and before he levelled his somewhat hazy charges against the management of the Edinburgh Gas-Works (as reported in another column), has finished its labours, it would be injudicious to accept his suspicions as facts, or to attach much more than a passing interest to them. It was unfortunate that the illness of Mr. Mitchell, the Engineer of the Edinburgh works, prevented his being present; otherwise much that has been left open to doubt might have been explained. Mr. Mitchell, I understand, has been very ill indeed, but is recovering. His health has not been good since last year, when he went to America for its benefit, and came back considerably improved. Perhaps the lime affair may be attributable to the state of his health; and if so excuse is to be easily found for him. If that should be the case, however, it but shifts the responsibility on to other shoulders; for undoubtedly Mr. Wells discovered a lapse in connection with the lime supply which, to say the least, is an ugly incident. It was the only part of Mr. Wells's remarks in which he was treading on solid ground; and though not a serious incident in itself, it gives cause for entertaining his other assertions, or rather insinuations. On account of this circumstance, it may not be out of place to devote a little consideration to his deliverances. Dealing with them in the first place according to the method of the inner criticism, it has first to be noticed that there was a grave inconsistency in Mr. Wells's attitude in respect that, while in one breath he spoke of apologizing to the Corporation of Edinburgh for his having been a party to assuring them that the gas produced at the New Street works was of normal quality, whereas he now believed it was not, a little further on he announced that the defective lime would not have affected the illuminating power but only the purity of the gas. It was, as a matter of fact, the illuminating power of the gas which Mr. Falconer King, the City Analyst, reported as being low; its purity was never questioned. Had Mr. Mitchell used the usual quantity of lime, the purity of the gas would have been affected; and then Mr. Wells would have had occasion to apologize; but the foundation of his charge was that the lime being defective, much more of it was required. This fact, whatever blame there may be in allowing such lime to be supplied, certainly argues that the staff in the gas-works were careful to keep up the purity. I have a much graver fault to find with Mr. Wells; and upon a matter of fact. He threw out the charge that for the last ten years the coal contracts had gone to the same parties. Now, on the face of it there is nothing wrong in that, although it were the case. It would be much on a par with a remark to the effect that for the past ten years the Company, and following them the Commissioners, had kept their accounts in the same bank. What he meant may not have been what he said. If he intended to say that during the past ten years certain coal contractors had been taken in turns, to the exclusion of others, that, for aught I know, may be true; but in itself it would be no discredit. If he meant that the same people got the contracts every year, then he was wrong. I have taken some trouble to ascertain the facts on this matter, and find that in the year 1889-90 just 22 varieties of coal were contracted for; in 1890-91 there were 26 varieties—of which only 14 were the same as in the previous year, 12 new contractors being introduced; and in 1891-92, the current year, there are 35 varieties—of which there are 16 the same as in 1889-90, and 5 the same as those which were new in 1890-91, leaving 14 new contractors introduced this year. These are two very serious detractions from Mr. Wells's charges; and if, on the one hand, he obtains weight from the lime incident, on the other hand, he loses greatly on account of the rashness of his assertions. Everyone can wait till he either proves his complaints to be well founded or they are disproved by the Committee of Inquiry. Meanwhile there is every reason for holding that, barring the little lime affair, everything is as it should be in the New Street works.

The municipal elections are in full swing; but this year they do not bring much grist to my mill. In Edinburgh it was supposed to be the question of the addition to the water supply which was to be discussed before the electors. Matters have turned out otherwise, however; the water supply being seldom mentioned, except as a passing notice. Bailie Archibald and Mr. Wells, in Leith, both this week addressed to to the electors a few remarks on the gas supply. Bailie Archibald informed the people that, though the Gas Commissioners have raised the price of gas, they have, in the reduced charge for public lighting and in the giving up of meter-rents, saved the public over £11,000 a year; and Mr. Wells, in amplification of his charges referred to above, stated that if Edinburgh and Leith were severed in the matter of gas supply, the people of Leith could have gas for 1s. less per 1000 cubic feet than the price charged in Edinburgh. In this I presume Mr. Wells is right; the explanation being that the Leith works and plant have required no extensions or renewals since the transfer in 1888, which bears out all that was written in this column at the time of the transfer. To go further afield, the only other place where reference is being made to any question relating to gas supply is in Aberdeen, where occasionally a municipal candidate refers to the affair between Mr. Smith, the Gas Manager, and Mr. Councillor Pratt. Mr. Pratt himself makes the most of the incident, and endeavours to persuade the electors that in the insult which was offered to him the whole of his constituents were insulted. I am afraid Mr. Pratt's chances of doing much more harm, or good, according to the way his conduct is looked at, is likely to be soon put an end to; for the Trades' Council have thrown him over, because this ardent radical and supporter of the claims of the working classes, underpays his own workmen. Dundee and Perth are both quiescent on gas matters; only an occasional reference being made to them by a candidate who, finding nothing else to have a shot at, trots out the gas supply as one of the subjects which require reform—a proceeding which is likely to prove as ineffectual in the way of securing votes as it is harmless to the gas industry. Perhaps the most serious question which has been raised in my district is in Arbroath, where the working class community are agitated over the fact that the Police Commissioners do not keep a sufficient number of public lamps alight till six o'clock in the morning, so as to let the workers see their way to the factories. The question is quite a legitimate one to discuss; but the fact that this is the most formidable lighting question which is raised in a general municipal election, has this significance, that it shows that, notwithstanding the readiness which there is to take up and to manufacture grievances in connection with gas supply, not even the most inveterate grumbler can find anything to complain of. Could a better testimonial be given to the general efficiency of the gas supply over a wide tract of country?

The accounts of the Aberdeen Corporation Gas Department for the year ending Sept. 30, were before the Town Council yesterday (Friday). Bailie M'Kenzie, the Convener of the Gas Committee, had an encouraging tale to tell. They had produced 367 million cubic feet of gas during the year, of which they had sold 337,085,500 cubic feet, leaving 29,914,500 cubic feet (or 8¼ per cent.) unaccounted for. The increase was 29,114,000 cubic feet on the output, and 28,208,600 on the quantity sold. This is a good result, in face of the rise of 2d. per 1000 cubic feet upon the price of gas a year ago. There is this further satisfaction, that the unaccounted-for gas was reduced from 8¼ to 8¼ per cent., which is going in the right direction, and, as Bailie M'Kenzie said, shows that their distributing plant is in good order. Another item of a satisfactory nature is that the wages account, although the output was greater, was reduced from £6315 to £6148, which is attributed to the operation of the stoking and coal-breaking machinery. An item which is not so satisfactory in one respect, but which is rather favourable than otherwise in present circumstances, is that the stock of coal having been carefully gone over, it was found that there was about 2000 tons more than the books showed. Apparently, stock has not been taken for some years, with the result, as the Lord Provost said, that the stock-keeper had taken care that he did not charge himself with too little, and there had been a constantly increasing outcome. The value of these coals, amounting to £1850, has been placed to the reserve fund, raising it to £10,000. Perhaps the greatest satisfaction of all will be felt in the circumstance that the Corporation are able to go on supplying gas at 3s. 8d. per 1000 cubic feet, the same price as during the past year. The year began with a balance of £58, and ended with one of £1625. For the current year a revenue is estimated of £74,200, which, with the balance brought forward, will make £77,110; and as the expenditure is estimated at £77,959, a deficit of £779 is provided for.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

The Glasgow City Chamberlain (Mr. J. Nicol) has just completed and issued a valuable book dealing with the "Vital, Social, and Economic Statistics of Glasgow" for the past six years—the time of publication being made to coincide with the greatest event which has ever happened in the history of the commercial capital of Scotland. That event is the extension of the municipal boundaries so as to include an additional area of 5750 acres, or nearly nine square miles, having a population of upwards of 91,000, and a rental of close upon £600,000. In this additional area there are embraced half-a-dozen suburban burghs and several non-burghal districts which lie upon their confines. The fresh territory in question, which will become an integral portion of the city with the close of the month of October, will have to be lighted by the City Lighting Department, as most of it has for years been supplied with the lighting material by the Corporation Gas Trust. It has been divided into nine wards; and each of them will next Tuesday elect three representatives on the Town Council, which body will be increased from 48 to 75 members. Consequently the Gas and Electric Lighting Committee will have nine new members. What I am more especially anxious to state in connection with this great municipal extension event is that Mr. Nicol takes occasion, in his interesting volume, to compare the Glasgow gas supply of this year with that of the year 1886, when his last volume of statistics was issued. Speaking of the gas supply, he goes on to say that this invaluable illuminant continues to be employed in increasing measure, and it is also largely used for heating, cooking, and power purposes. Gas was first introduced into the city in 1818, and on the 5th of September the first street lamp was lit with it, exciting no little wonder and delight. The supply continued in private hands until 1869, when it was assumed by the Corporation. At the date of the transfer the productive power of the works was 5 million cubic feet per diem; in 1874 it had reached 9 millions; in 1886 it was 16 millions; and now (October, 1891) it is 24¾ millions. The three works of Dawsholm, Dalmarnock, and Tradeston are about equal in productiveness. There are at the Dawsholm works, 832 retorts; at the Dalmarnock works, 826 retorts; and at the Tradeston works, 816 retorts—together 2474 retorts, each capable of producing 10,000 cubic feet of gas daily. Of course, these statistics deal with the supply of gas as it was in 1886, without any reference to the Partick works, and those of Pollokshaws and Old Kilpatrick and Dalmuir, which are now also the property of the Glasgow Corporation.

Before leaving the question of the Glasgow gas supply, I may mention one or two things that may be called current events. It has been resolved, by a meeting of the Conveners and Sub-Conveners of the Gas Committee and Sub-Committees thereof, to recommend the payment of the following premiums on account of the results of the manufacture of gas at the various works of the Corporation during the financial year which ended on May 31 last, to the managers of the respective stations: The Dalmarnock works, £170; the Dawsholm works, £170; and the Tradeston works, £150.

I am told that Mr. Foulis, Engineer-in-Chief to the Glasgow Gas Commissioners, has got his drawings completed for the new holder which it is intended to erect on a portion of the spare ground at the Temple Farm works, the capacity of which is to be between five and six million cubic feet. The plans have been approved by the Works Sub-Committee; and tenders for the construction and erection of the gasholder are forthwith to be advertised for.

Through Paisley there runs a river, named the Cart, which discharges itself into the Clyde some seven or eight miles below Glasgow; and it has long been the desire of many Paisley people to make it a

navigable river. An Act of Parliament was passed several years ago authorizing the deepening of the river, and the construction of a harbour; the Cart Navigation Trust being created for the purpose. The majority of the members of the Trust are supplied from the Town Council. It was lately found that all the funds which the Trust had authority to raise had been expended without the authorized works being completed. In their straits, the Trust memorialized the Town Council, as the Gas Trust, to hand over to them a vote of £2000 out of last year's gas surplus. This matter was referred to by the Convener of the Gas Committee when he recently addressed a meeting of his Ward constituents. He said that he could not understand a body of gentlemen making such a proposal, unless they were in desperation for money, and did not care what source it came from. The Town Council would not consent to do anything in the matter without being fortified by the opinion of Counsel that it was legal to grant the request. The opinion of an eminent Edinburgh advocate has been obtained this week, and it goes "dead against" the proposal.

At this stage, I may briefly refer to the question of "Paisley *versus* Greenock Gas Surplus," which was lately touched upon by Treasurer D. M'Innes, of Greenock, in terms which Mr. Hislop, of Paisley, has considered himself warranted in taking notice of. In a letter to a local paper, he says that Treasurer M'Innes's statement on the subject is altogether misleading; since he has most ingeniously concealed the fact that the price of gas in Greenock is 3s. 4d. per 1000 cubic feet, as against 2s. 10d. in Paisley (while of fully equal quality), which, on the quantity of gas sold in Greenock last year, amounts to £4734. He overlooks the fact also that in Paisley there was spent on ordinary and extraordinary repairs the sum of £2816 more than in Greenock; besides which the gas supplied for public lighting is charged at a lower rate per 1000 cubic feet, which is equal to £184. To this add the little sum which Mr. M'Innes has placed to the credit of Paisley (£286), and the annual excess of profits over those of Greenock is found to amount to £8020. The Greenock Treasurer has not, so far as I am aware, deemed it politic to attempt to answer these facts submitted by Mr. Hislop in defence of what he knows to be the actual state of the case as regards the Paisley gas surplus.

The Glasgow pig iron market has been rather flat this week; but Scotch warrants have remained steady at 47s. per ton cash, at which there were buyers at the close yesterday. A considerable amount of business has been done in Cleveland and hematite warrants, the prices of which have fluctuated about 1s. per ton; the close yesterday, however, being about 3½d. for the former and 6½d. for the latter above the lowest quotations.

There has been some activity in the local coal trade this week; but no advance in prices has been established. Considerable orders remain to be executed in the shipping department. Best dross is now moving off well; but inferior sorts have been difficult to dispose of.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 31.

Sulphate of Ammonia.—The market closed with a somewhat quieter tone; but without change in values. There is a fair inquiry; but buyers' ideas remain low, and there is consequently not much business. The demand for future delivery is improving; and as the position of nitrate is favourable, sulphate values may be enhanced as the consuming season comes nearer. Spot values are £10 11s. 3d. to £10 12s. 6d. Hull, and £10 10s. Leith and Liverpool. Nitrate is quoted at 9s. 1½d.

LONDON, *Oct.* 31.

Tar Products.—Some business is reported in benzol; but the prices of 50's. and 90's. both continue to decline. The demand for toluol appears to have fallen off in the most unaccountable manner; and those who stocked the article in hope of higher prices, which would result from the new use of it for manufacturing saccharine, are greatly disappointed. There is an excellent demand for pitch; and its value is maintained. The other tar products, including anthracene, are all neglected; and prices have a downward tendency. The little life which carbolic products showed a month or two ago, has utterly left that article; and it is now weaker than ever. Nominally quotations are: Tar, 22s. 6d. to 24s. Pitch, 33s. to 34s. 6d. Benzol, 90's, 3s. 6d.; 50's, 2s. 4½d. Toluol, 1s. 4½d. Solvent naphtha, 1s. 4½d. Crude naphtha, 1s. 1d. Creosote, 1½d. Carbolic acid crystals, 5½d.; Crude, 60's, 1s. 1½d. Cresol, 7½d. Anthracene, "A" quality, 1s. 2d.; "B," 10d.

Sulphate of Ammonia.—The demand for this article is again very slack. Business is reported at prices ranging from £10 7s. 6d. to £10 12s. 6d., less 3¼ per cent. discount, according to port of shipment; but there are more sellers than buyers. Forward business is a little better; but there is not now the same urgency for forward contracts. Gas liquor is quoted at 4s. to 5s.

THE LANCASHIRE GAS COAL TRADE.

From Our Own Correspondent.

The month has closed with a decidedly less animated tone throughout the coal trade of this district; and any anticipations of a further upward movement in prices for November are not being realized. The better qualities suitable for house-fire purposes, although still moving off pretty freely, with the demand generally taking away the whole of the output, are not in any actual pressing request; and prices are not more than moderately firm at recent quotations. Best Wigan Arley averages 12s. 6d. per ton, 13s. being obtained in some instances; Pemberton 4-feet and second qualities of Arley, 10s. 6d. to 11s.; and common house-fire coals, 9s. to 9s. 6d. per ton. With regard to the lower qualities of round coal, although requirements for gas making are necessarily taking away increasing quantities, supplies are still plentiful for iron-making, and steam and general manufacturing purposes, the demand for which continues only very limited. With the close of the Baltic shipping season, surplus supplies from Yorkshire are coming into this district, with the result that colliery proprietors are finding it difficult to maintain late rates. At the pit's mouth, good ordinary descriptions of steam and forge coals are quoted at about 8s. to 8s. 6d. per ton; but under these figures in many cases has to be taken to effect sales. Engine classes of fuel remain without improvement. Though the better qualities of burgy and slack are moving off fairly well, supplies are more than sufficient, while the common sorts of slack continue a general drug upon the market, and surplus supplies are pushed for sale at such excessively low figures, that prices all through are weak and irregular. Any strict adherence to list rates is practically out of the question, while contracts for next year can only be secured at very substantial reductions upon last season's prices—in most cases amounting to 1s. 9d. and 2s. per ton. At the pit's mouth, good qualities of burgy do not average more than 6s. 6d. per ton, and best qualities of slack 5s. 6d., with good descriptions obtainable readily at 4s. 6d. per ton, and common sorts offered in special lots at from 2s. 6d. to 3s. per ton and upwards. For shipment, although considerable difficulty is experienced in obtaining vessels, there are fair inquiries, and prices remain steady at 9s. 6d. to 10s. per ton for good steam coal delivered on the Mersey.

The Northern Coal Trade.—The steam coal trade is flat; and the price of coals of that class is lower, partly because the advance in the rate of freights forces shippers to hold back their orders as long as they possibly can, and partly because of the few orders that remain to be executed for the Baltic trade. Best Northumbrian steam coals have been sold at 10s. 9d. per ton, free on board; but the general price is 11s. Small steam coals are quiet at about 4s. For gas coals, the demand is good; and the consumption is now very large, especially in the local towns, though it will increase still more for about two months. The collieries are rather unevenly placed; and the price varies from about 9s. per ton free on board to 10s. less a slight discount. In bunker coal, there is rather a quiet tone just now; and from 8s. for unscreened up to 12s. for best Durham screened, shows the variation in price. Manufacturing coal has been quieter, because of the strikes, which have lessened the consumption. For blast-furnace coke, about 16s. per ton free on board is now the quoted price; and the demand is rather better. Gas coke is unchanged in price; but the production is now naturally increasing.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 794.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	15 Oct.	10½	Alliance & Dublin 10 p. c.	10	16—17	..	6 3 6
100,000	10	"	7½	Do. 7 p.c	10	11½—12½	..	6 0 0
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	106—108	..	4 12 7
100,000	20	28 May	8	Bahia, Limited	20	13—15	..	10 13 4
200,000	5	13 May	7½	Bombay, Limited	5	6¾—7¼	..	5 3 5
40,000	5	"	7½	Do. New	4	4¾—5¼	..	5 14 1
380,000	Stck.	13 Aug.	12½	Brentford Consolidated	100	215—225	..	5 8 10
125,000	"	"	9½	Do. New	100	157—162	..	5 14 2
220,000	20	16 Sept	11½	Brighton & Hove Original	20	40—42	..	5 9 6
444,250	Stck.	16 Sept.	10	Bristol	100	208—213	..	4 13 11
320,000	20	15 Oct.	11½	British	20	44—46	..	4 17 10
50,000	10	28 Aug.	11½	Bromley, Ordinary 10 p. c.	10	18—20	..	5 15 0
50,380	10	"	8½	Do. 7 p. c.	10	13—15	..	5 13 4
328,750	10	13 Nov.	6	Buenos Ayres (New) Limited	10	6½—7½	..	—
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	92—96	+1½	6 5 0
150,000	20	13 Aug.	8	Cagliari, Limited	20	24—26	..	6 3 1
550,000	Stck.	15 Oct.	13¾	Commercial, Old Stock	100	240—250	+5	5 10 0
161,396	"	"	10¾	Do. New do.	100	185—195	..	5 10 3
130,000	"	26 June	4½	Do. 4½ p. c. Deb. do.	100	119—124	..	3 12 7
800,000	Stck.	11 June	10	Continental Union, Limited	100	220—230	..	4 6 11
200,000	"	"	7	Do. 7 p. c. Pref	100	190—200	..	3 10 0
75,000	Stck.	16 Sept.	10	Crystal Palace District	100	190—200	..	5 0 0
486,090	10	15 July	10	European, Limited	10	19—20	−1	5 0 0
354,060	10	"	10	Do. Partly paid	7½	14—15	−½	5 0 0
5,470,640	Stck.	13 Aug.	13	Gaslight & Coke, A, Ordinary	100	217—222	−1	5 17 1
100,000	"	"	4	Do. B, 4 p. c. max.	100	94—97	..	4 2 5
665,000	"	"	10	Do. C, D, & E, 10 p.c. Pf.	100	251—256	..	3 18 1
30,000	"	"	5	Do. F, 5 p. c. Prf.	100	118—123	..	4 1 4
60,000	"	"	7½	Do. G, 7½ p. c. do.	100	172—177	..	4 4 9
1,300,000	"	"	7	Do. H, 7 p. c. max	100	155—160	..	4 7 6
463,000	"	"	10	Do. J, 10 p. c. Prf.	100	250—255	..	3 18 5
476,000	"	"	—	Do. K, 6 p. c. Prf.	100	145—155	..	3 17 5
1,061,150	"	11 June	4	Do. 4 p. c. Deb. Stk.	100	112—115	..	3 9 7
294,850	"	"	4½	Do. 4½ p. c. do.	100	120—125	..	3 12 4
908,000	"	"	6	Do. 6 p. c. do	100	163—168	..	3 11 5
3,800,000	Stck.	13 May.	12	Imperial Continental	100	219—224	−1	5 7 2
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	4¾—4¾	..	6 6 4
560,000	100	1 Oct.	5	Met. of Melbourne, 5p. c. Deb.	100	109—111	..	4 10 1
541,920	20	11 June	6½	Monte Video, Limited	20	16½—17½	..	7 8 6
150,000	5	28 May	10	Oriental, Limited	5	8¾—8¾	..	5 14 3
60,000	5	30 Sept.	7	Ottoman, Limited	5	4—5	..	7 0 0
166,870	10	26 Feb.	2	Pará Limited	10	2½—3½	..	—
				People's Gas of Chicago—				
420,000	100	4 May	6	1st Mtg. Bds.	100	92—97	..	6 3 9
500,000	100	1 June	16	2nd Do.	100	90—95	..	6 6 4
150,000	10	15 Oct.	10	San Paulo, Limited	10	13—14	..	7 2 10
500,000	Stck.	28 Aug.	15½	South Metropolitan, A Stock	100	255—265	..	5 17 0
1,350,000	"	"	12	Do. B do.	100	215—225	..	5 6 8
200,000	"	"	13	Do. C do.	100	225—235	..	5 10 8
700,000	"	26 June	5	Do. 5 p. c. Deb. Stk.	100	140—145	−½	3 9 0
600,000	Stck.	16 Sept.	11½	Tottenham & Edm'nton, Orig.	100	—	..	—
				WATER COMPANIES.				
729,281	Stck.	26 June	10	Chelsea, Ordinary	100	265—270	..	3 14 1
1,720,560	Stck.	15 Oct.	8	East London, Ordinary	100	204—209	..	3 16 7
544,440	"	26 June	4½	Do. 4½ p. c. Deb. Stk.	100	138—143	..	3 3 0
700,000	50	11 June	8	Grand Junction	50	105—110	..	3 12 9
708,000	Stck.	13 Aug	10½	Kent	100	265—275	..	3 16 4
1,043,800	100	26 June	9½	Lambeth, 10 p. c. max.	100	256—241	..	3 18 10
406,200	100	"	7½	Do. 7½ p. c. max.	100	195—200	..	3 15 0
260,000	Stck.	30 Sept.	4	Do. 4 p. c. Deb. Stk.	100	118—121	..	3 6 1
500,000	100	13 Aug.	12½	New River, New Shares	100	341—346	..	3 10 1
1,000,000	Stck.	30 July	4	Do. 4 p. c. Deb. Stk	100	123—126	..	3 3 6
902,300	Stck.	11 June	6½	S'thwk & V'xhall, 10 p. c. max.	100	160—165	−5	3 18 9
126,500	100	"	6½	Do. 7½ p. c. do.	100	160—165	..	3 18 9
1,155,066	Stck.	11 June	10	West Middlesex	100	252—257	..	3 17 10

Generous Public Gift by a Glasgow Coal-Master.—Mr. J. Wood, member of the firm of Messrs. J. and W. Wood, coal-masters, of Glasgow and London, has intimated his intention of presenting a public park, hall, and reading-room to the inhabitants of Armadale, if he can come to a satisfactory arrangement with Lord Hopetown's Commissioner with regard to the ground.

The Woking District Gas-Works.—These works, which have been undertaken by Messrs. Alfred Williams and Co., of Bankside, for the Woking District Gas Company, Limited, have been commenced, and will be pushed on and completed as rapidly as possible, so that a supply of gas may be looked for in the course of about four months.

Richmond and Co., Limited, Warrington.—The first annual general meeting of the shareholders of this Company has just been held at the new works in Academy Street, Warrington—Mr. W. Mortimer in the chair. A short account of the Company's development was given; and the statement of accounts for the year was read by another Director (Mr. L. Voisey, J.P.), who pronounced them to be most satisfactory, as all the preliminary expenses are cleared off, and patterns and plant heavily depreciated. A dividend of 5 per cent. was declared. We hear that the Company intend shortly opening premises in London.

The Projected Water Scheme for Lurgan.—Last Thursday, Mr. C. P. Cotton, C.E., one of the Inspectors of the Local Government Board for Ireland, held an inquiry at Lurgan into an application recently made to the Local Government Board by the Town Commissioners for their sanction to the borrowing from the Board of Works a sum of £20,000 to be expended in providing the town with an adequate and pure supply of water from Castor's Bay, Lough Neagh, situate at a distance of about one and a half miles from Lurgan. Evidence was given which showed that the present supply was procured altogether from wells, that it was insufficient, and very uncertain. There was no opposition. The plans and specifications for the scheme have been prepared by Mr. W. B. Bryan, M. Inst. C. E., the Engineer of the East London Water-Works Company.

The Salford Gas Case.—At a special meeting of the Salford County Borough Council last Friday, reference was made to the trial of Mr. Kershaw on the charge of attempting to bribe the Gas Engineer (Mr. S. Y. Shoubridge), a report of which will be found in our "Legal Intelligence" to-day. Alderman Makinson remarked that the action against Mr. Kershaw had resulted in a complete exposure of that gentleman; and, so far as the Gas Committee were concerned, the ends of justice would be fully vindicated. Would the Committee, under these circumstances, consider the desirableness of applying to the Court that the proceedings might be withdrawn, especially as the health of Mr. Kershaw had become terribly affected? Mr. Rycroft asked if the attention of the Gas Committee had been called to the statement reported as having been made by Mr. Waddy in the course of the trial, that certain commissions were perfectly legitimate in their way; but the habit had grown very largely indeed in Salford, of underhandedly bribing officials of the Corporation so as to get an unfair advantage in the matter of contracts. Was this said under instruction; and if so, to what official did it apply other than the late Gas Engineer? The Town Clerk said he was not aware that Mr. Waddy used those words. He did not think they were used; but if they were, they were used without instruction. Mr. Phillips said that Mr. Waddy did employ the words; but he certainly had no instructions to use them so far as the Gas Committee were concerned. As to the withdrawal of the prosecution against Mr. Kershaw, the Gas Committee had not considered the question; and he was unable to make any statement on the matter. The action was brought, not by the Corporation, but by the Crown.

The Kempston Gas Company, Limited, is the title of a new Company which has been registered with a capital of £5000, in £5 shares, to manufacture and supply gas in the parishes of Kempston, Wooton, and Elston, in Bedfordshire, and to carry on the general business of a gas company.

Sale of Shares.—At a sale by auction last Tuesday, six £10 shares (£7 per cent.) in the *Hythe Gas Company* were sold at £10 5s. each; and a similar number of original shares realized £11 each. On the same occasion, six £10 shares in the *Ashford Gas Company* were knocked down at £17 5s. each.

Bombay Gas Company, Limited.—In a circular which the Secretary of the above Company (Mr. J. Hill Perrins) has sent to the shareholders, reminding them that at the last interim meeting it was decided that, in future, only the annual meeting of the Company in May should be held, it is stated that the Directors have had an approximate profit and loss account for the half year ending June 30 last made up, which shows an ample balance available for the payment of the usual interim dividend, which they have accordingly declared at the rate of 3½ per cent., free of income-tax. They are also able to report that the Company's business continues to progress satisfactorily.

Proposed Purchase of the Todmorden Gas-Works.—Considerable interest is being taken by the ratepayers of Todmorden in the action of the Local Board in appointing a Committee to make inquiries with a view to the purchase of the gas-works. The inhabitants generally, it is stated, are in favour of the transfer; but they declare that rather than give an exorbitant price for the works, they would not make the purchase. Some time ago a proposal to acquire the concern was negatived by a large majority; and it was then thought that the sum required was too heavy. In addition to the Todmorden works, those of Messrs. Fielden Bros., Limited, of Waterside, can now be acquired by the Board.

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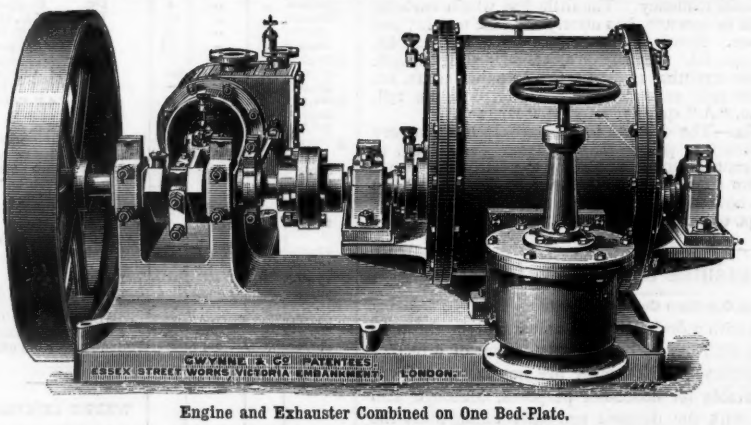

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Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

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For further information, apply to Mr. John Williams, Town Hall, Mountain Ash.

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By order,
WILLIAM JURNOCK,
Clerk to the Guardians.

Union Offices, Hoole, Chester,
Oct. 28, 1891.

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Compiled and arranged by **ALFRED LASS**, Fellow of the Institute of Chartered Accountants.

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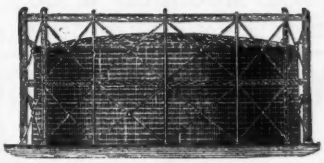

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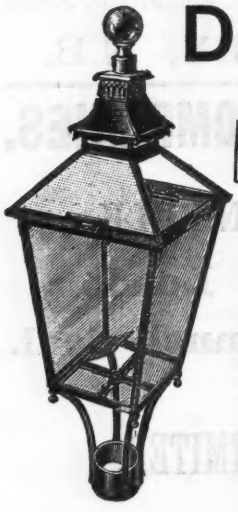

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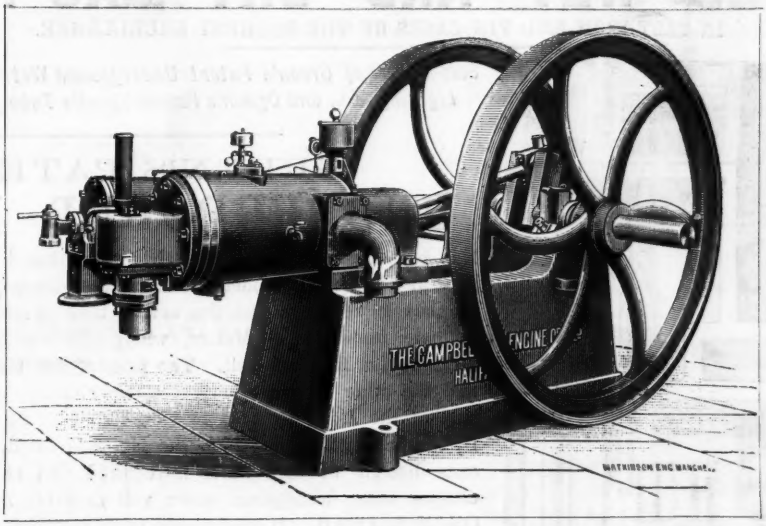

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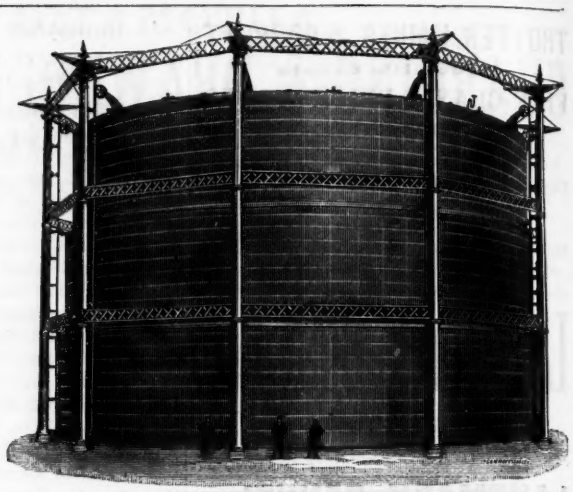

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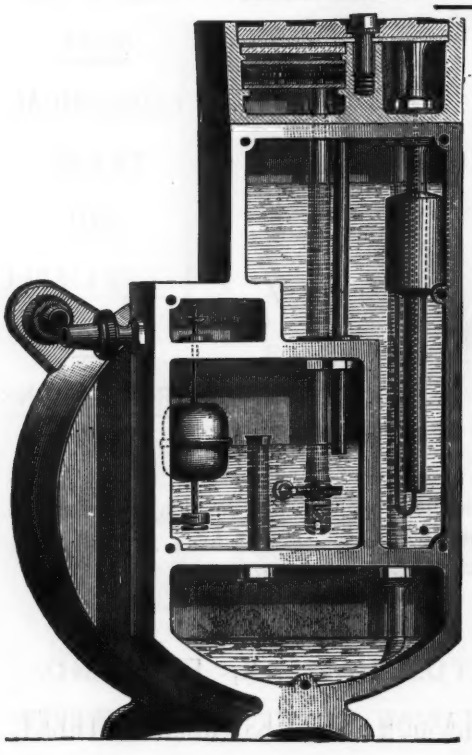

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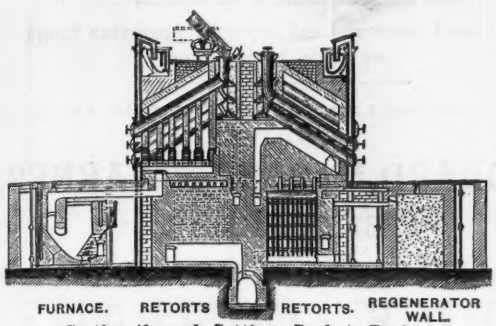
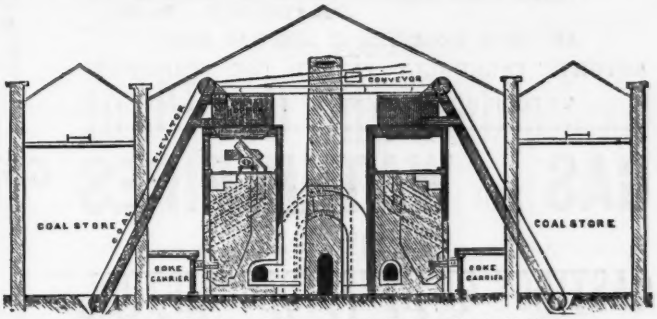
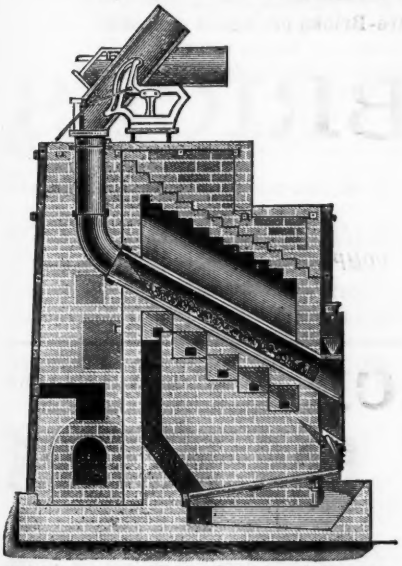


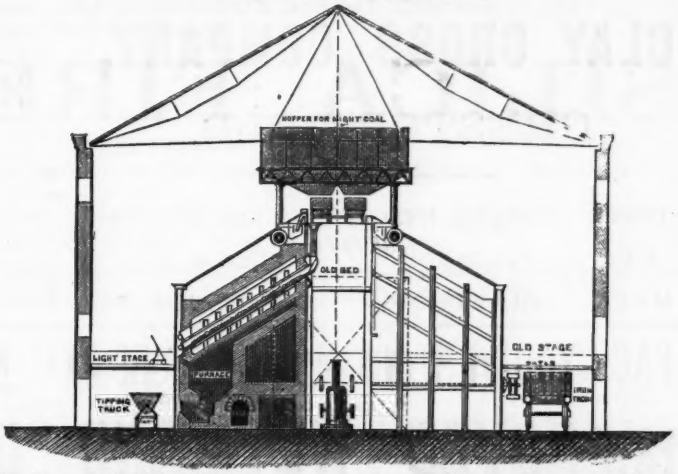
Section through Settings Back to Back.
Working off ground floor with Generator under Stage and Regenerator under the Sets.



Transverse Section of House with Coze's Single Settings,
Showing Method of working Two Single Settings and Distributing the Coal to the Supply Hoppers; the whole of the work being Automatic.
This plan is for a large House.



Section through Middle Retort and Furnace.



Section of old Retort-House converted, Two Sets 20 fts. in place of One.
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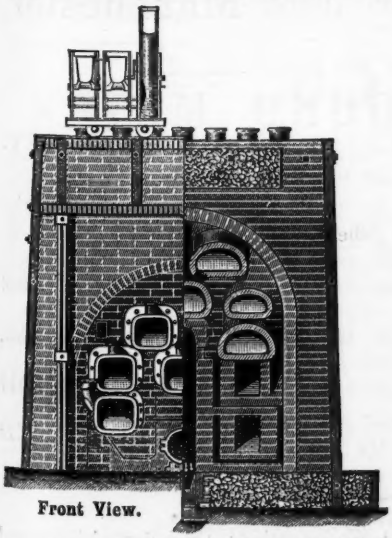
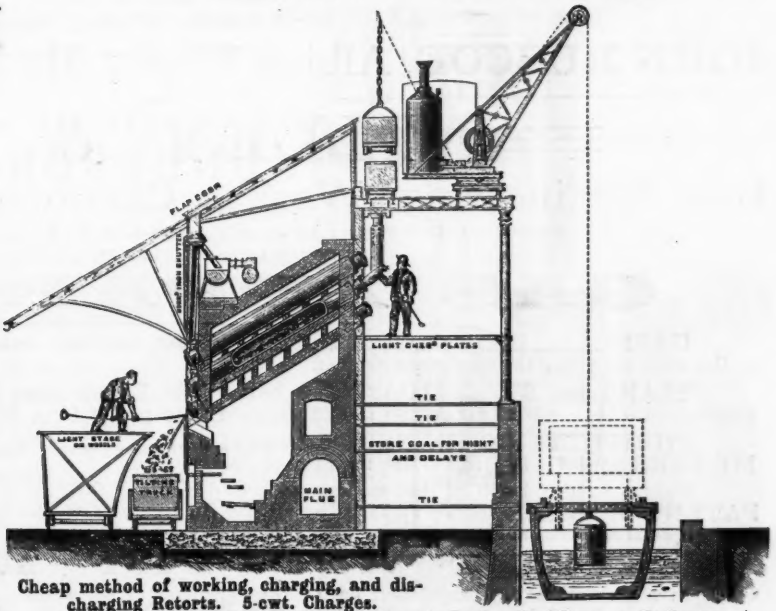


Front View.

Section through Furnace & Bed.



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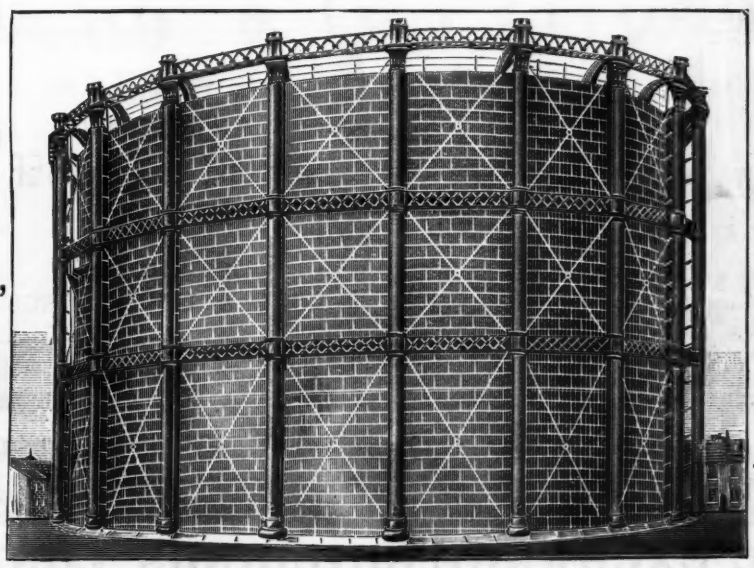

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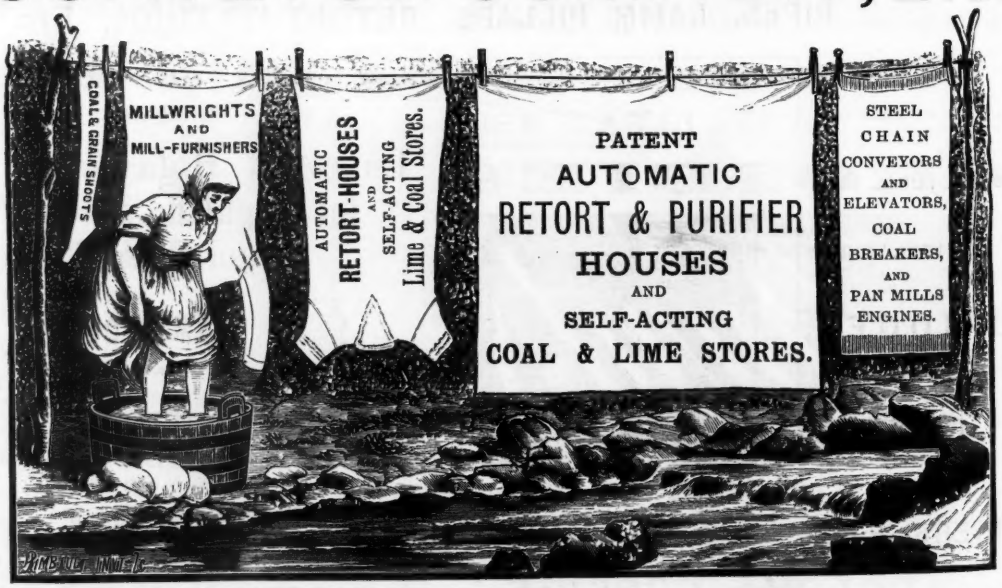
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THE

VALUATION OF GAS-WORKS FOR ASSESSMENT,

By THOMAS NEWBIGGING, M. Inst. C.E.,

With an Appendix containing a Statement of the most Important Cases bearing on the Question, and decided by the Superior Courts. Each of these is preceded by a Digest; and the Judgments are given in full.

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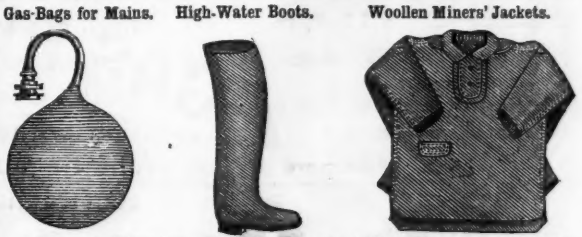

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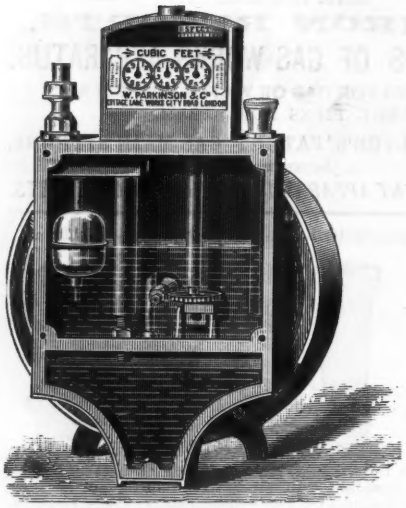

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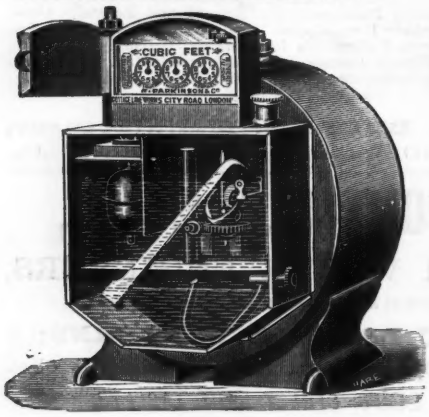

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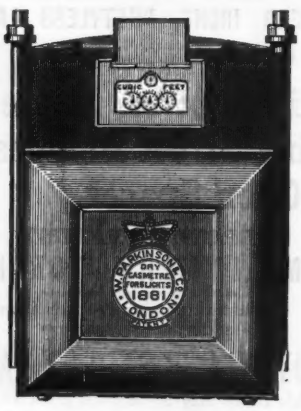

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[See also Advt., p. 790.

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